Brussels, XXX
[…](2017) XXX draft

COMMISSION REGULATION (EU) …/…

of XXX

implementing Directive 2009/125/EC of the European Parliament and of the Council with regard to ecodesign requirements for household refrigerating appliances and low noise refrigerating appliances

repealing
Regulation (EC) No 643/2009 with regard to ecodesign requirements for household refrigerating appliances

(Text with EEA relevance)

COMMISSION REGULATION (EU) …/…

of XXX

implementing Directive 2009/125/EC of the European Parliament and of the Council with regard to ecodesign requirements for household refrigerating appliances and low noise refrigerating appliances

repealing
Regulation (EC) No 643/2009 with regard to ecodesign requirements for household refrigerating appliances

(Text with EEA relevance)

THE EUROPEAN COMMISSION,

Having regard to the Treaty on the Functioning of the European Union,

Having regard to Directive 2009/125/EC of the European Parliament and of the Council of 21 October 2009 establishing a framework for the setting of ecodesign requirements for energy-related products[1], and in particular Article 15(1) thereof,

Whereas:

(1) Pursuant to Directive 2009/125/EC, the Commission should set ecodesign requirements for energy-related products for which there are significant volumes of sales and trade, which have a significant effect on the environment and which offer significant potential for improving their design, without entailing excessive costs.

(2) Pursuant to Article 16(2)(a) of Directive 2009/125/EC, the Commission should, where appropriate, introduce implementing measures for products which offer significant potential for reducing greenhouse gas emissions in a cost-effective way, such as household refrigerating appliances and low noise refrigerating appliances. These implementing measures should be introduced in accordance with the procedure referred to in Article 19(3) and the criteria set out in Article 15(2) of the same Directive. The Commission should consult the Ecodesign Consultation Forum on the measures to be introduced.

(3) Provisions on the ecodesign requirements of household refrigerating appliances were established by Commission Delegated Regulation (EU) No. 643/2009 of 22 July 2009 supplementing Directive 2009/125/EC[2].

(4) Regulation (EU) 643/2009 contains a review clause in Article 7 requiring the Commission to review the regulation in light of technological progress.

(5) The Commission has reviewed Regulation (EU) 643/2009 and analysed technical, environmental and economic aspects of household refrigerating appliances and low noise refrigerating appliances as well as real-life user behaviour. The review was undertaken in close cooperation with stakeholders and interested parties from the

[1] OJ L 285, 31.10.2009, p. 10.
[2] OJ L 191, 22.07.2009, p53.

Union and third countries. The results of the review were made public and presented to the Consultation Forum established by Article 18 of Directive 2009/125/EC.

(6) The review study shows the benefit of continued and improved requirements, adapted in stringency to the technological progress of household refrigerating appliances. Specifically it shows that wine storage appliances can be introduced in the scope of this Regulation and that correction factors can be eliminated or significantly reduced. Wine storage appliances with glass doors are out of the scope of this Regulation, they are commercial refrigerating appliances.

(7) The annual electricity consumption of products subject to this Regulation in the Community was estimated at 86 TWh in 2015, corresponding to 34 million tonnes of CO_2 equivalent. While the projected energy consumption of household refrigerating appliances in a business as usual scenario will decrease by 2030, this reduction is expected to slow down unless the existing ecodesign requirements are updated.

(8) The Regulation should cover wine storage appliances and mini bars.

(9) Some refrigerating appliances intended for non-residential use are equivalent to household refrigerating appliances and should therefore be in scope of this regulation. As an example, a professional chest freezer that is intended for professional use and that is equivalent to a household chest freezers should be in the scope of the regulation.

(10) The environmental aspects of the household refrigerating appliances that have been identified as significant for the purposes of this Regulation are energy consumption in the use phase, increased energy use over the product life due to leaking door gaskets and suboptimal food preservation options leading to avoidable food waste.

(11) Measurements of the relevant product parameters should be performed through reliable, accurate and reproducible measurement methods, which take into account the recognised state-of-the-art measurement methods including, where available, harmonised standards adopted by the European standardisation bodies, as listed in Annex I to Directive 98/34/EC of the European Parliament and of the Council ([3]).

(12) In accordance with Article 8 of Directive 2009/125/EC, this Regulation should specify the conformity assessment procedures applicable.

(13) In order to facilitate compliance checks, manufacturers should provide information in the technical documentation referred to in Annexes V and VI to Directive 2009/125/EC in so far as that information relates to the requirements laid down in this Regulation.

(14) Increased emphasis on fighting products with automatically altering performances in test conditions to improve the declared parameters is important for the effectiveness and credibility of the Regulation. This Regulation has introduced extra measures to this effect.

(15) In addition to the legally binding requirements laid down in this Regulation, indicative benchmarks for best available technologies should be identified to make information on the life-cycle environmental performance of products subject to this Regulation widely available and easily accessible.

(16) A review of this Regulation should assess the appropriateness and effectiveness of its provisions in achieving its goals. The timing of the review should be sufficient for all provisions to be implemented and show an effect on the market.

(17) The measures provided for in this Regulation are in accordance with the opinion of the Committee established by Article 19(1) of Directive 2009/125/EC.

HAS ADOPTED THIS REGULATION:

Article 1

Subject matter and scope

1. This Regulation establishes ecodesign requirements for placing on the market and putting into service of:

(a) electric mains-operated household refrigerating appliances with a volume between 10 and 1500 litres;

(b) electric mains-operated low-noise refrigerating appliances with a volume between 10 and 60 litres.

2. This Regulation shall not apply to:

(c) products covered by Commission Regulation (EU) 2015/1095 with regard to ecodesign requirements for professional refrigerated storage cabinets, blast cabinets, condensing units and process chillers;

(d) commercial refrigerating appliances;

(e) mobile refrigerating appliances.

Article 2

Definitions

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

1. 'household refrigerating appliance' means a refrigerating appliance, integrating the condenser and cold generator in one package with a factory-sealed cooling circuit used in household environments. This also includes equivalent refrigerating appliances intended for non-household environments such as professional chest freezers;

2. 'refrigerating appliance' means an insulated cabinet with one or more compartments that are controlled at specific temperatures below the ambient temperature;

3. ‘low noise refrigerating appliance’ is a refrigerating appliance with noise power emission smaller than 20 dB(A);

4. ‘mains’ or ‘electric mains’ means the electricity supply from the grid of 230 (±10%) Volt of alternating current at 50 Hz;

5. ‘volume’ means the volume of the space within the inside liner of the refrigerating appliance;

6. ‘commercial refrigerating appliances’ means refrigerating appliances used in non-household environments with a display and/or payment function to facilitate the

selection and purchase of the refrigerated items. This category includes wine storage appliances and low noise refrigerating appliances with a display function;

7. ‘mobile refrigerating appliances’ means refrigerating appliances used in vehicles and/or any other means of transportation where there is no access to the mains electricity grid, that can operate reliably and safely when exposed to mechanical vibrations and a tilted position as well as use extra low-voltage electricity (<120V DC) and/or fossil fuel as the energy source for the refrigeration functionality;

8. 'wine storage appliance' means a dedicated appliance for the storage of wine, with precision temperature control as defined Annex III, Table 3, and equipped with anti-vibration measures;

9. 'cold generator' means the part of a refrigerating appliance that generates a temperature difference allowing heat to be extracted from inside the cabinet and transferred to the ambient air;

10. 'equivalent refrigerating appliance' means a model placed on the market with the same total and compartment volumes, the same technical, efficiency and performance characteristics, and the same compartment types as a household refrigerating appliance model placed on the market under a different model number by the same manufacturer;

11. ‘display-function’ means a functionality of a refrigerating appliance to see its content, either by one or more transparent doors or by open access to at least one side of the appliance;

12. ‘payment-function’ means a functionality allowing customers to pay for and acquire merchandise inside the refrigerating appliance;

13. 'compartment volume' means the volume of the space within the inside liner of the compartment;

14. ‘compartment’ means an enclosed space within a refrigerating appliance, which is directly accessible through one or more external doors and which may itself be divided into sub-compartments having a different operating temperature range from the compartment within which it is located. For the purpose of this regulation, unless specified otherwise, ‘compartment’ refers to both compartments and/or sub-compartments;

15. ‘external door’ is the part of a cabinet that can be moved or removed to at least allow be able to insert or extract the load from the exterior to the interior or from the interior to the exterior of the cabinet.

Article 3

Ecodesign requirements

The ecodesign requirements for household refrigerating appliances and low noise refrigerating appliances within the scope of this Regulation are set out in Annex II.

Article 4

Conformity assessment

1. The conformity assessment procedure referred to in Article 8 of Directive 2009/125/EC shall be the internal design control system set out in Annex IV to that Directive or the management system set out in Annex V to that Directive.

2. For the purposes of conformity assessment pursuant to Article 8 of Directive 2009/125/EC, the technical documentation file shall contain a copy of the product information provided in accordance with Annex II, point 2, and the results of the calculations set out in Annex III to this Regulation.

Where the information included in the technical documentation for a particular household refrigerating appliance model has been obtained by calculation on the basis of design, or extrapolation from other equivalent household refrigerating appliances, 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. In such cases, the technical documentation shall also include a list of all other equivalent household refrigerating appliance models where the information included in the technical documentation was obtained on the same basis.

Article 5

Verification procedure for market surveillance purposes

Member States shall apply the verification procedure described in Annex IV to this Regulation when performing the market surveillance checks referred to in Article 3(2) of Directive 2009/125/EC.

Article 6

Indicative benchmarks

The indicative benchmarks for the best-performing products and technologies available on the market at the time of adopting this Regulation are set out in Annex V.

Article 7

Repeal

Commission Regulation (EC) No 643/2009 shall be repealed as from 31 March 2020.

Article 8

Review

The Commission shall review this Regulation no later than five years after its entry into force and shall present the results of this review, including a draft revision proposal to the Ecodesign Consultation Forum. This review shall assess the requirements in the light of technological progress, in particular regarding the requirements for low noise appliances and wine storage appliances.

Article 9

Entry into force

1. This Regulation shall enter into force on the twentieth day following that of its publication in the Official Journal of the European Union.

2. The generic ecodesign requirements set out in point 1 of Annex II shall apply from 1 April 2020. The specific ecodesign requirements for the Energy Efficiency Index set out in point 2 of Annex II shall apply in accordance with the timetable set out in Tables 1 and 2 of Annex II.

This Regulation shall be binding in its entirety and directly applicable in all Member States.

Done at Brussels,

Done at Brussels, For the Commission

Jean-Claude JUNCKER
The President

DRAFT ANNEXES
to

COMMISSION REGULATION (EU) …/…

implementing Directive 2009/125/EC of the European Parliament and of the Council with regard to ecodesign requirements for household refrigerating appliances and low noise refrigerating appliances

repealing
Regulation (EC) No 643/2009 with regard to ecodesign requirements for household refrigerating appliances

ANNEX I

Definitions applicable for Annexes I to VI

In addition to the definitions set out in Directive 2009/125/EC and the definitions set out in Article 1 of this Regulation, the following definitions shall apply:

(1) ‘compartment type’ means the declared compartment type in accordance with the refrigerating performance parameters T_{min}, T_{max}, T_c and others as set out in Annex III, Table 3;

(2) ’variable temperature compartment’, means a compartment intended for use as two (or more) alternative compartment types (e.g. 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 (e.g. a chill compartment that may also fulfil zero-star requirements) is not a variable temperature compartment;

(3) ‘climate class’ means the range of ambient temperatures in which the appliances are intended to be used, and for which the required storage temperatures specified in Table 1 are to be met. There are four climate classes (with their acronym and ambient temperature range): ‘Extended Temperate’ (‘SN’ for +10 to +32 °C), ‘Temperate’ (‘N’ for +16 to +32 °C), ‘Subtropical’(‘ST’ for +16 to +38 °C) and ‘Tropical’ (‘T’ for +16 to +43 °C);

(4) 'daily energy consumption' (E_{daily}) means the electricity used by a refrigerating appliance over 24 hours at reference conditions expressed in kWh/24h, as calculated in Annex IV.1.b on the basis of test procedures indicated in Annex III.4;

(5) ‘annual energy consumption’ (*AE*) means the average daily energy consumption multiplied with 365 (days per year) expressed in kWh, as calculated in Annex IV.1.b;

(6) ‘standard annual energy consumption’ (*SAE*) means the reference annual energy consumption of a refrigeration appliance expressed in kWh, as calculated in Annex IV.1.c;

(7) ‘total average steady state power consumption’ (P_{ss}) means the average power consumption in steady state conditions expressed in W, as determined in accordance with Annex III and Annex IV;

(8) ‘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;

(9) ‘manual defrost’ means not having an auto-defrost feature;

(10) ‘defrost interval’ ($t_{d\text{-}f}$) 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 h;

(11) ‘incremental defrost and recovery energy consumption’ ($\Delta E_{d\text{-}f}$) means the extra average energy consumption for a defrost and recovery operation expressed in Wh, as determined in accordance with Annex III and Annex IV;

(12) 'temperature rise time' means the time taken, after the operation of the refrigerated system has been interrupted, for the temperature in a 3- or 4 star compartment to increase from −18 to −9 °C expressed in h;

(13) 'specific freezing capacity' (x) means the rate of heat extraction by an appropriately loaded refrigeration system, 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;

(14) ‘frozen compartments’ means the group of compartment types with a target temperature equal to or below 0°C, as set out in Annex III, Table 3;

(15) 'fast freeze' means a reversible feature, to 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;

(16) ‘refrigerator-freezer’ means a combi that has at least one freezer compartment and one or more unfrozen or chill compartments, of which one fresh food compartment;

(17) ‘winter switch’ means a control feature for a refrigerator-freezer with one compressor and one thermostat in the fresh food compartment, consisting of an appropriate sensory and switching device that activates or de-activates an artificial heat load in the fresh food compartment in order to guarantee, even if it would not be required for the fresh food compartment, that the compressor keeps on working to maintain the proper minimum temperature in the freezer compartment;

(18) 'through-the-door device' means a device that dispenses chilled or frozen load on demand from a household refrigerating appliance, through an opening in its external door and without opening that external door. Examples are ice-cube dispensers or chilled water dispensers;

(19) ‘unfrozen compartments’ means the group of compartment types with a target temperature equal to or above 4°C, as set out in Annex III, Table 3;

(20) 'two-star section' means part of a three-star or four-star compartment which does not have its own individual access door or lid and in which the temperature is not warmer than −12 °C;

(21) ‘minimum temperature’ (T_{min}) means the minimum temperature inside a compartment during testing and relates to the minimum temperature for testing energy consumption (average over time and over a set of sensors) or the instantaneous values over the test period, as set out in Annex III, Table 3;

(22) ‘maximum temperature’ (T_{max}) means the maximum temperature inside a compartment during testing and relates to the maximum temperature for testing energy consumption (average over time and over a set of sensors) or the instantaneous values over the test period, as set out in Annex III, Table 3;

(23) ‘target temperature’ (T_c) means the reference temperature inside a compartment c during testing as set out in Annex III, Table 3, and relates to the maximum temperature for testing energy consumption and is the average over time and over a set of sensors;

(24) ‘chill compartment’ is a compartment type with performance requirements with a target temperature equal to 2°C, as set out in Annex III, Table 3;

(25) ‘4-star’ means a rating for a freezer compartment that fulfils the storage conditions indicated in Annex III, Table 3 and also fulfils a minimum specific freezing capacity requirement that entails that the temperature of the light load is brought down from +25 to −18 °C within 24 hours. If the minimum freezing capacity cannot be guaranteed at all times within the ambient temperature operating range indicated by the manufacturer or importer, a 4-star rating does not apply;

(26) ‘defrost and recovery period’ means the period from the initiation of a defrost control cycle until stable operating conditions are established;

(27) 'average power consumption' (P) means the average rate of energy consumption of a refrigerating appliance for a specific test condition or operation expressed in Watts;

(28) ‘temperature control cycle’ (TCC) means definite repetitive swings in temperature caused by operation of a temperature control device (on/off or otherwise). The period of a temperature control cycle is the time between a control event and its repetition on the next cycle. Where the control events cannot be discerned, the period of a temperature control cycle is the time between two successive temperature warmest points or two successive temperature coldest points. If no repetitive pattern can be distinguished, ‘fixed time slices’ can be used to establish whether steady state conditions are fulfilled;

(29) ‘fixed time slice’ means a fixed length period of no less than a minimum number of hours as set out in Annex III.3(2) that may be used as an alternative to using TCCs in defining a block of test data, e.g. in case there are no discernible changes in temperature or power consumption over time;

(30) ‘combi appliance’ means a refrigerating appliance that has more than one compartment type, except in the case of a freezer (3- or 4-star) compartment featuring also a two-star section or sub-compartment;

(31) ‘dedicated appliance’ means a refrigerating appliance with only one type of compartment;

(32) ‘thermodynamic factor’ (r_c) means the temperature difference between the target temperature T_c of compartment c and the reference ambient temperature at +24 °C, expressed as a ratio of the same difference for a fresh food compartment at +4 °C, following the expression $r_c = (24-T_c)/20$;

(33) 'M_c' *and* 'N_c' are parameters that take into account the volume-dependence of the energy use, with values as set out in Annex IV, Table 4;

(34) 'auto-defrost factor' (A_c) means a compensation factor for frozen compartments, with values as set out in Annex IV, Table 4;

(35) 'built-in factor' (B_c) means a compensation factor for built-in appliances, with values as set out in Annex IV, Table 4;

(36) 'combi-factor’ (C) means a compensation factor for the energy consumption related to controlling the cooling of multiple compartment types; with values as set out in Annex IV, Table 4;

(37) 'door heat loss factor' (D) means a compensation factor for combi-appliances with more than 2 doors with values as set out in Annex IV, Table 4;

(38) 'load factor' (L) means a compensation factor 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 set out in Annex IV, Table 4;

(39) ‘c’, means index number suffix for a compartment type in an appliance;

(40) ‘built-in appliance’ means any household refrigerating appliance that is designed, intended, tested and marketed exclusively

- to be installed in cabinetry or totally encased (top, bottom, sides and back) by panels, and
- to be securely fastened to the sides, top or floor of the cabinetry or panels, and
- to be equipped with an integral factory-finished face or to be fitted with a custom front panel.

ANNEX II

Ecodesign requirements

The manufacturer shall establish conformity with this regulation based on the measurements and calculations described in Annex III and Annex IV respectively and following the definitions in Annex I and Article 2.

1. Energy efficiency index of household refrigerating appliances:

   (a) From 1 April 2020, the energy efficiency index of refrigerating appliances shall not be above the values in Table 1:

Table 1

First tier maximum EEI of refrigerating appliances, expressed in %

	EEI
household refrigerating appliances, except for wine storage appliances	125
wine storage appliances	155
low noise refrigerating appliances	300

   (b) From 1 April 2023, the energy efficiency index of household refrigerating appliance shall not be above the values in Table 2:

Table 2

First tier maximum EEI of refrigerating appliances, expressed in %

	EEI
household refrigerating appliances, except for wine storage appliances	100
wine storage appliances	155
low noise refrigerating appliances	250

2. Product information:

   (a) From 1 April 2020, the instruction manuals for installers and end-users, and free access website of manufacturers, their authorised representatives and importers shall provide the following product information, in the order as set out below:

      (1) the technical parameters set out in point (b);

      (2) the compartment type(s);

      (3) the compartment volume(s);

      (4) the combination of drawers, baskets and shelves that result in the most efficient use of energy for the appliance;

(5) the recommended setting of temperatures in each compartment for optimum compromise between food preservation and energy consumption;

(6) where and how to store fresh foodstuffs and beverages in a refrigerating appliance for best preservation over a the longest period, to avoid food waste;

(7) an estimate of the impact of temperature settings on energy consumption;

(8) a description of the effects of special modes and features, and in particular how temperatures are affected in each compartment and for how long;

(9) for wine storage appliances, 'this appliance is intended to be used exclusively for the storage of wine';

(b) The technical documentation for the purposes of conformity assessment pursuant to Article 4 shall contain the following elements:

(1) overall dimensions, expressed to the nearest millimetre, means space taken up by the refrigerating appliance (height, width and depth) with doors or lids closed;

(2) total volume of the appliance, in dm^3 or litres rounded to the nearest integer, matching the sum of the compartment volumes in point c) hereafter;

(3) volume, in dm^3 or litres rounded to one decimal place, per compartment, identified by the name and meeting the performance requirements of the compartment type as indicated in Annex III, Table 3. Variable temperature compartment will be identified separately with the compartment type characteristics for which it is declared to be suitable;

(4) target temperature, in °C rounded to the nearest integer, per compartment;

(5) for low noise refrigerating appliances ‘low noise refrigerating appliance’;

(6) for wine storage appliances ‘wine storage appliance’;

(7) climate class: SN, N, ST or T;

(8) minimum and maximum ambient temperature, in °C rounded to the nearest integer, for which the appliance is suitable;

(9) daily energy consumption, E_{16C} and E_{32C} in kWh/24h rounded to three decimal places;

(10) annual energy consumption, *AE* in kWh rounded to the nearest integer;

(11) standard annual energy consumption, *SAE* in kWh rounded to the nearest integer;

(12) total average steady state power consumption, P_{ss} in W rounded to two decimal places;

(13) energy efficiency index EEI, number expressed in % rounded to the nearest integer;

(14) defrosting type, means the method to remove frost accumulation on the evaporator(s) of an appliance, distinguishing ‘auto-defrost’ or ‘manual defrost’;

(15) defrost interval control, meaning the control parameter that determines the interval between defrost cycles, distinguishing between ‘timer’, ‘compressor run-time’ or ‘variable defrost’, whereby the latter may be based on operational parameters (door-openings, inserting warm load) or direct measurement of frost accumulation;

(16) representative incremental defrost and recovery energy consumption, $\Delta E_{d\text{-}f}$ in Wh rounded to one decimal place;

(17) defrost interval, $t_{d\text{-}f}$ in h, at 16 and 32 °C ambient temperature, rounded to two decimal places;

(18) temperature rise time, in h rounded to hours and whole minutes;

(19) specific freezing capacity, x in kg/12h, rounded to one decimal place;

(20) winter switch present, yes/no;

(21) star rating in case of a frozen compartment with this feature as indicated in Annex III, Table 3;

(22) fast freeze in case of a frozen compartment with this feature as indicated in Annex III, Table 3;

(23) anti-condensation heater type ‘manual on-off’, ‘ambient controlled’, ‘other’ or ‘none’;

(24) airborne acoustical noise emissions expressed in dB(A) re1 pW, rounded to the nearest integer;

(25) individual measurement results for P_{ss}, $\Delta E_{d\text{-}f\ \ td\text{-}f}$ from valid test runs at 16°C and 32 °C ambient temperature for household appliances and at 25°C ambient temperature for low noise appliances;

(26) if applicable, interpolation or triangulation calculations to arrive at the assessment of E_{daily} per relevant ambient temperature.

3. Other:

From 1 April 2020:

(a) a product shall not be designed so that its performance automatically alters in test conditions with the objective of reaching a more favourable level for any of the parameters specified in 2 or in any documentation provided with the product;

(b) gaskets shall be replaceable without special tools and manufacturers shall be able to supply end-users with fitting door gaskets for their household refrigerating appliances for at least 10 years after the production of the specific model has ceased. Relevant information for ordering these door gaskets, directly or through resellers, shall be supplied on the manufacturer’s website and in the booklet of instructions;

(c) 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;

(d) Refrigerator-freezers with one thermostat and one compressor 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 food compartment at the correct temperature;

ANNEX III

Measurements and calculations

A. Measurements

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 takes into account the generally recognised state-of-the-art methods. They shall fulfil the conditions and technical parameters set out in points 1 to 6 and in B. points 1 to 2.

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;

(b) for refrigerating appliances with automatically controlled electric anti-condensation heaters, the automatically controlled electric anti-condensation heaters will be switched off or otherwise disabled, where possible, during the measurement of electricity consumption. The electricity consumption of these heaters will be calculated from their power consumption declared by the manufacturer for 10 humidity conditions and 3 ambient temperature conditions.

(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 as the compartment type which has the highest energy consumption;

(e) for refrigerating appliances that can be digitally connected, this functionality shall not be disabled but there will be no active sending or receiving of data.

1. Assessment of volume:

(1) General:

The volume shall take into account the exact shapes of the walls including all depressions or projections.

When the volume is determined, internal fittings such as shelves, removable partitions, containers and interior light housings shall be considered as not being in place.

The volume of control housings, evaporator space, air ducts required for proper cooling and operation of the unit, the volume of any fixed or removable partition between compartments and sub-compartments, the space occupied by shelves moulded into the inner door panel shall be considered as being in place and their volumes deducted.

For through the door ice and water dispensers, the ice chute shall be included in the volume up to the dispensing function. The through the door ice and water dispensers and the insulating hump are not included in the volume. No part of the dispenser unit shall be included as volume.

(2) Volume of evaporator space:

The volume of the evaporator space shall be the product of the depth, width and height. The total volume to be deducted shall comprise the following:

(a) in the case of a forced air evaporator, the total volume of the evaporator cover and behind the evaporator cover shall be deducted, including the volume occupied by the evaporator fan and the fan scroll;

(b) in the case of plate style (e.g. roll-bond) evaporators, the volume behind vertically installed plate-style evaporators and the volume above horizontally installed plate -style evaporators if the distance between the horizontal plate -style evaporator and the nearest liner surface above is less than 50 mm. Removable drip trays/troughs shall be considered as not being present;

(c) in the case of refrigerant filled shelving, the volume above the uppermost shelf and below the lowermost shelf, if the distance between the shelf and the nearest horizontal plane of the cabinet inner wall is less than or equal to 50 mm. All refrigerated shelves are considered as not present;

(d) in case there is a fan installed in an unfrozen compartment with a refrigerated wall evaporator or a plate style evaporator, the volume of the fan.

(3) Two-star sections and/or compartments:

Two-star sections and/or compartments are permitted both in the door and in the remaining volume of a refrigerating appliance when all the following conditions are met:

(a) the two-star section or compartment is marked with the appropriate identification symbol;

(b) the two-star section and/or compartment is separated from the three-star of four-star volume by a partition, container, or similar construction;

(c) the rated total two-star section volume does not exceed 20 % of the total volume of the compartment;

(d) the instructions give clear guidance regarding the two-star section and/or compartment;

(e) the volume of the two-star section and/or compartment is stated separately and is not included in the three-star or four-star volume.

2. Storage conditions and target temperatures per compartment type:

The following Table gives the storage conditions and target temperature per compartment type:

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*	*nr.*	*°C*	*°C*	*°C*
Un-frozen compartments	Pantry	[2]	+14	+20	+17
	Wine storage	[2][3]	+5	+20	+12
	Cellar	[2]	+2	+14	+12
	Fresh food	[2]	0	+8	+4
Chill compartment	Chill	[4]	−3	+3	+2
Frozen compartment	0-star & ice-making	[5]	*n.a.*	0	0
	1-star	[5]	*n.a.*	−6	−6
	2-star	[5][6]	*n.a.*	−12	−12
	Freezer (3 and 4-star)	[5][6]	*n.a.*	−18	−18

Notes:

[1] T_c relates to the target temperature for testing energy consumption and is the average over time and over a set of sensors.

[2] T_{min} and T_{max} relate to average values measured over the test period (average over time and over a set of sensors) .

[3] The average temperature variation over the test period for each sensor shall be no more than ±0,5 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.

[4] T_{min} and T_{max} relate to instantaneous values during the test period.

[5] T_{max} relates to average values measured over the test period (average over time and over a set of sensors).

[6] During a defrost and recovery period, the maximum temperature of all sensors is not permitted to rise more than 3.0 K.

n.a.=not applicable

3. Energy consumption tests household refrigerating appliances:

(1) Introduction

The energy consumption of an appliance is determined from measurements taken when tested with appropriate test conditions in an ambient temperature of 32 °C and an ambient temperature of 16 °C. The value of the energy consumption shall be for a temperature control setting (or equivalent point) where all average compartment air temperatures are at or below the target temperatures specified in Table 1 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) average steady state power consumption P_{ss}, measured at 16 °C ambient temperature and measured at 32 °C ambient temperature;

(b) incremental defrost and recovery energy $\Delta E_{d\text{-}f}$ (in Wh) for products with one or more auto-defrost systems (each with its own defrost control cycle), the defrost and recovery energy for a representative number of defrost and recovery periods for each system shall be determined;

(c) defrost interval $t_{d\text{-}f}$ (in h) for products with one or more defrost systems (each with its own defrost control cycle), the defrost interval $t_{d\text{-}f}$ (in h) shall be determined for each system under a range of conditions.

Throughout all tests the reference average ambient temperatures of 16 and 32 °C have to be maintained with a bandwidth of ± 0,5 K. On top of that, for steady state power consumption the test results will be corrected for smaller deviations from the reference. Note that for all compartments, the air temperatures of the compartment(s) will be measured and not the temperature inside ballasts. The appliance doors will remain closed and no warm load is introduced in the storage volume(s).

Each of these parameters will be determined through separate (sets of) tests. To improve the efficiency and accuracy of testing, the test period is not fixed, but is determined by whether a 'steady state' is reached.

Steady state is defined as a condition that occurs when test results comply with a series of acceptance criteria, laid down in an accurate, reliable and reproducible test method, to ascertain that stable test conditions occur. These acceptance criteria include that spread and slope of the average compartment air temperature and average power consumption between a minimum number of non-overlapping sampling periods or 'blocks' are within a specific narrow bandwidth. Furthermore there are rules as regards:

(a) the minimum number of blocks;

(d) position of the blocks (adjacent or not, distance to defrost and recovery period, depending on the purpose of the test);

(e) minimum number of temperature control cycles ('TCCs') or minimum length in time per block ('fixed time slices' in case no repetitive patterns can be established);

(f) repeatability (e.g. that a valid set of blocks of test data is preceded by a minimum number of also compliant set of blocks);

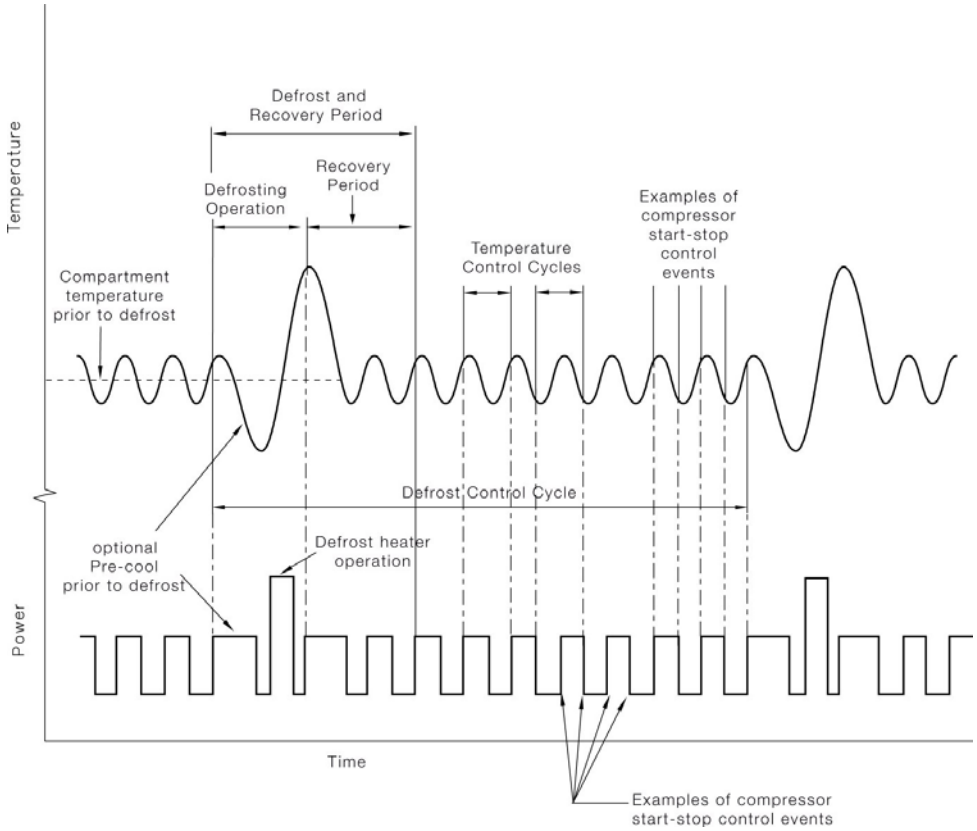
(g) the type of compartments to measure in a combi-appliance;

(h) how to extend the test data if the first test runs do not comply with the acceptance criteria.

Figure 1 gives an illustration of a typical compartment air temperature and electricity input for a refrigeration appliance:

Figure 1

Illustration of a typical compartment air temperature and electricity input for a refrigeration appliance



(2) Steady state power consumption

(1) Manual Defrost

For manual defrost products using a TCC-based test procedure, the acceptance criteria and rules for steady state energy consumption include:

(a) a minimum number of 3 adjacent blocks of an equal number of TCCs (at least 1 TCC per block);

(b) a minimum test period (6h);

(c) a maximum spread across blocks for temperature (0,25K) and power consumption (varies between 1% for a 12h test period and 3% for a test period of 36 hours or more, with linear interpolation in between);

(d) a maximum slope between the first and last block for temperature (0,025 K/h) and power consumption (less than 0,25%/h).

A valid steady state test period can start only after already two successive test-periods, each containing three blocks, meet the above criteria. In case of multi-compartment appliances, the temperatures relate to those in the largest frozen and the largest unfrozen compartment or –in case all compartments are either all frozen or all unfrozen—the largest two compartments.

In case of using 'fixed time slices' for testing of manual defrost products, the minimum test period is 12h, the maximum power spread is always 1%

independent of the test period. The other acceptance criteria are the same as for appliances tested using TCCs.

(2) Auto defrost

For auto-defrost appliances also the manual defrost method can be used to establish the steady state energy consumption. Only in case it is difficult to find a valid steady state energy consumption in between defrost and recovery periods two separate blocks may be used, each ending at the start of a defrost and recovery period. Each block shall contain at least 4 TCCs and one block should not be 25% longer or shorter than the other. In case of fixed time slices the blocks shall be no less than 4 h in length and blocks must have equal lengths. If the time between defrost and recovery periods exceeds 48 hours, the start of the second block may be selected after this 48 h period. The maximum allowed average temperature spread between the blocks is 0,5 K. The maximum allowed spreads in power consumption shall be less than 2 % (relative spread) or less than 1 W (absolute spread), whichever is the greater value.

(3) Incremental defrost and recovery energy consumption

For auto-defrost appliances the incremental defrost and recovery energy $\Delta E_{d\text{-}f}$ is established by finding two valid steady state blocks, following steady state acceptance criteria similar to those mentioned in Section 4.(2), one before and one after the defrost and recovery period. The reference point for defrost and recovery period is 2 h after the (first) activation of the defrost heater. The end of the first block is 3 h before and the start of the second block is 3 h after this reference point. Each block contains at least 3 TCCs or has a fixed length of 3 h. The start of the first block shall be no less than 5 h after the initiation of the previous 'defrost heater on' or, in the case where there is no defrost heater, no less than 5 h after the interruption of the refrigeration system related to the automatic defrost. The second block shall not overlap with the subsequent defrost and recovery period.

Note that if these initial start, stop and interval values do not deliver an acceptable result they can be shifted.

The relevant test period runs from the start of the first block until the end of the second block, i.e. with the defrost and recovery period in between. The total energy consumption during this test period is measured. Subsequently, the total energy consumption for that period is calculated as if it were the steady state energy consumption, based on the steady state power measured in the two steady-state blocks. The difference between the two is the incremental defrost and recovery energy consumption.

The test(s) shall be done at least for each temperature control setting. The defrost and recovery period selected for each temperature control setting shall be adjacent to the steady state period used for energy determination. In case there is more extensive test data, the average of at least 4 defrost and recovery incremental energy consumption data, for each control setting, shall be used. In this case at least 50 % of all values of ΔE_{df} shall have the coldest compartment at or below target temperature. A separate value for ΔE_{df} shall be determined for each ambient temperature.

(4) Defrost and recovery frequency and interval

There are three methods of defrost interval control, meaning the control parameter that determines the interval between defrost cycles, distinguishing between ‘timer’,

‘compressor run-time’ or ‘variable defrost’, whereby the latter may be based on operational parameters (door-openings, inserting warm load) or direct measurement of frost accumulation.

For the timer-control, which is relatively rare, the interval can be measured directly. Values for at least three defrost intervals shall be determined, with at least one value at an ambient temperature of 16 °C and one value at an ambient temperature of 32 °C.

For the compressor run-time control, the past run-time of the compressor is used as a proxy for the door-openings and inserted warm load.

For the compressor run-time control, the interval can be measured directly. Tests shall be undertaken over a whole defrost control cycle, at least one at each ambient temperature, in order to verify that it is a run time controller and estimate the value of the interval. Complementary test at e.g. other ambient temperatures and/or temperature control settings are required to check consistency of the interval with the compressor run time. The coefficient of variation (standard deviation divided by the mean) of the estimated values for compressor run time shall be less than 10 % for the defrost intervals examined; otherwise the controller shall be qualified as a ‘variable defrost’ controller.

For a variable defrost controller the interval is calculated on the basis of values specified by the manufacturer for Δt_{d-max} maximum possible defrost interval at an ambient temperature of 32 °C and Δt_{d-min} minimum possible defrost interval at an ambient temperature of 32 °C, both expressed in hours.

The value for Δtdf16 at an ambient temperature of 16 °C shall be double the value of the defrost interval Δtdf32 for an ambient temperature of 32 °C.

Δt_{d-min} shall not exceed 12 h at an ambient temperature of 32 °C (elapsed time). Δt_{d-max} shall not exceed 96 h at an ambient temperature of 32 °C.

Δt_{d-min} shall be based on the shortest conceivable defrost interval under heavy usage conditions (i.e. heavy use, frequent door openings and high humidity) at an ambient temperature of 32 °C. Tests under heavy usage conditions to verify the claimed value may be undertaken. The value for Δt_{d-max} shall be achievable under test conditions with compartment temperatures at or below target temperatures in steady state. Manufacturers shall specify any special condition required to achieve the claimed value.

In case the manufacturer does not supply declared values for Δt_{d-min} and Δt_{d-max}, default values of 6 h for Δt_{d-min} and 96 h for Δt_{d-max} shall be used, resulting in a Δt_{df32} of 24 h and a Δtdf16 of 48 h.

If, apart from the manufacturer not declaring the values, the verification test shows the operation not consistent with a variable defrost controller then the averages of 3 defrost intervals at both 16 and 32°C ambient is measured and used as values for Δt_{df16} and Δt_{df32} respectively, whereby Δt_{df16} shall not exceed 20 h and Δt_{df32} shall not exceed 10 h.

4. Energy consumption tests low-noise refrigerating appliances:

Energy consumption of low-noise appliances shall be tested only at an ambient temperature of 25 °C. Low-noise appliances have no auto-defrost and thus the tests only determine the steady

state power consumption P_{ss25}. Otherwise, the test procedure is identical to that of dedicated cellar or pantry household appliances.

5. Performance of chill compartments:

In order to avoid loopholes in the declaration of chill compartments, as defined in Table 3, the following additional requirements apply:

(a) for a variable temperature compartment rated as fresh food and/or chill, the energy efficiency index shall be determined for each temperature condition and the highest value shall be applied;

(b) a chill compartment shall be able to control its average temperature during energy testing within a certain range without user-adjustments of its control; this shall be verified as follows:

  (a) determine the reference chill compartment temperature $T_{ccma,ref}$ by performing an energy consumption test at 32°C ambient. $T_{ccma,ref}$ is the interpolated value of T_{ccma} [1] (e.g. found at the interpolated fresh food compartment T_{ma} =4°C),

  (b) perform an energy consumption test at 16°C. T_{ccma} shall be within $T_{ccma,ref\pm1,5K}$ for any setting used for interpolation, with the limitation that the fresh food compartment T_{ma} shall be in the range from 2 to 6°C.

B. Calculations

1. For household refrigerating appliances

(1) Energy Efficiency Index EEI:

The Energy Efficiency Index EEI compares the Annual Energy consumption AE (in kWh/a) with the reference Standard Annual Energy consumption SAE (in kWh/a) and is calculated as:

$EEI = AE / SAE$;

the outcome is a dimensionless number, usually expressed as a percentage (%).

(2) Annual Energy consumption AE:

The Annual Energy consumption *AE* of a household refrigerating appliance is based on the measurements according Section A at two ambient test temperatures, 16 and 32°C, regarding:

  (a) steady state power consumption P_{ss} (per ambient temperature P_{ss16}, P_{ss32}) in W;

  (b) the incremental defrost energy consumption $\Delta E_{d\text{-}f}$ (per ambient temperature $\Delta E_{d\text{-}f16}$ and $\Delta E_{d\text{-}f32}$) in Wh;

  (c) defrost and recovery interval td-f in h (per ambient temperature $t_{d\text{-}f16}$ and $t_{d\text{-}f32}$).

The average daily energy consumption E_{daily} in kWh/24h is calculated from values at both ambient test temperatures E_{16C} and E_{32C} as follows:

[1] T_{ccma} = The time averaged chill compartment temperature is the integrated time average of the instantaneous average chill compartment temperature (T_{cca}) or the arithmetic average of the integrated time averaged chill compatment temperatures (T_{ccim}) (both methods give the same result). The suffix 'cc' indicates that T_{ma}, T_{im} and T_a relate to a chill compartment type.

$E_{daily} = (E_{16C} + E_{32C})$;

with $E_{16C} = 0.001 \cdot 24 \cdot (P_{ss16} + \Delta E_{d\text{-}f16} / t_{d\text{-}f16})$ and;

$E_{32C} = 0.001 \cdot 24 \cdot (P_{ss32} + \Delta E_{d\text{-}f32} / t_{d\text{-}f32})$.

The values for E_{16C} and E_{32C} may result from two or three point interpolations of outcomes from several test-runs.

The Annual Energy consumption AE in kWh/a is as follows:

$AE = 365 \cdot (E_{16C} + E_{32C}) \cdot 0{,}5$.

(3) Standard Annual Energy consumption SAE:

The Standard Annual Energy consumption *SAE* of a household refrigerating appliance is based on the type(s) and volume(s) of the compartments V_c (in dm³ or litres, with one decimal), its total volume *V* (in dm³ or litres, rounded to the nearest integer) and a series of parameters given in Table 4.

The Standard Annual Energy consumption *SAE*, in kWh/a, is calculated as follows:

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

where c is the compartment index suffix and n is the total number of compartment types.

Note that for the variable temperature compartments the compartment type with the lowest target temperature is chosen for which it is declared suitable.

Table 4

Default values of parameters per compartment type in the calculation of EEI

Compartment type	r_c	N_c	M_c	A_c	B_c	C	D	L_c
Name	-	-	-	-	-	-	-	-
Pantry	0.35	75	0,12	1,00	1,04	between 1,15 and 1,56 for refrigerator-freezers[a], 1,15 for other combis, 1,00 for dedicated appliances	1.02, 1.035, 1.05 for 3,4 or more than 4 doors	1,00
Wine storage	0.6							
Cellar	0.6							
Fresh food	1.00							
Chill	1.1	138	0,12		1,06			
0-star & ice-making	1.2	138	0,15	1,10	1,10			
1-star	1.5							
2-star	1.8							
Freezer (3- and 4-star)	2.1							0,9 if dedicated

[a] *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 $C = 1{,}89 - 1{,}1 \cdot frzf$;

– else $C = 1{,}15$.

2. Calculation methods for low-noise refrigerating appliances

The Energy Efficiency Index *EEI* (expressed in %) is calculated as above, i.e.:

$EEI=AE/AEC.$

Basis for the assessment of the energy consumption of low noise refrigerating appliances is the steady state power consumption at a single ambient temperature of 25 °C P_{ss25} (in W), measured in accordance with Section A.5.

The daily energy consumption $E_{daily25}$ at 25°C ambient temperature (in kWh/24h) is given by:

$E_{daily25} = 0{,}001 \cdot 24 \cdot P_{ss25}$.

The annual energy consumption *AE* (in kWh/a) is given by:

$AE = 365 \cdot E_{daily2}$.

Low noise appliances are manual defrost (A_c=1), stand-alone (B_c=1), dedicated (C=1), single door (D=1) appliances with cellar (r_c=0,6) or pantry (r_c=0,35) compartment type as defined in Tables 3 and Table 4. The latter implies N_c=75 and M_c=0,12 and L=1. The Standard Annual Energy consumption *SAE* (in kWh/a) can thus be simplified as follows:

– for cellar types: $SAE = 75 + V \cdot 0{,}6 \cdot 0{,}12 = 75 + 0{,}072V;$

for pantry types: $SAE = 75 + V \cdot 0{,}35 \cdot 0{,}12 = 75 + 0{,}042V.$

ANNEX IV

Verification procedure

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 this Annex, 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 Directive 2009/125/E, Annex IV, point 2, 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 5;

   (d) if the results referred to in point(b)(1) or (2) are not achieved, the model and all models that have been listed as equivalent household refrigerating appliance models in the manufacturer's or importer's technical documentation shall be considered not to comply with this Regulation;

   (e) if the result referred to in point (b)(3) 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;

   (f) 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 5;

   (g) if the result referred to in point (e) is not achieved, the model and all models that have been listed as equivalent household refrigerating appliance models in the manufacturer's or importer's technical documentation shall be considered not to comply with this Regulation;

   (h) 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 (c) and (f);

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 5 and shall only use 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 for parameters in Table 5.

Table 5

Verification tolerances

Parameters	Verification
Volume	The determined value shall not be less than the declared value by more than 3 % or 1 litre, whichever is the greater value. Where the volumes of the cellar compartment and the fresh food storage compartment are adjustable, relative to one another, by the user, the volume shall be tested when the cellar compartment is adjusted to its minimum volume.
Freezing capacity	The determined value shall not be less than the declared value by more than 10 %.
Energy consumption	The determined value shall not exceed the declared value of the annual energy consumption *AE* by more than 10 %.

ANNEX VI

Benchmarks

The best available technology on the market, at the time of entry into force of this Regulation, for the environmental aspects that were considered significant and are quantifiable is indicated below.

At the time of entry into force of this Regulation, the best available technology on the market for household refrigerating appliances in terms of their Energy Efficiency Index EEI and noise was identified as follows. The figures in brackets indicate the previous EEI-value according to the repealed Commission Regulation (EC) 643/2009.

Household refrigerating appliances:

Dedicated fresh food 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

Dedicated 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 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 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 be 'noisseless' (noise power <15 dB(A) according to current test standards)

Brussels, XXX
[…](2017) XXX draft

COMMISSION DELEGATED REGULATION (EU) …/...

of XXX

supplementing Regulation (EU) 2017/1369 of the European Parliament and of the Council with regard to energy labelling of household refrigerating appliances and low noise refrigerating appliances

repealing
Regulation (EU) No 1060/2010 with regard to energy labelling of household refrigerating appliances

(Text with EEA relevance)

EXPLANATORY MEMORANDUM

1. CONTEXT OF THE DELEGATED ACT

Legal framework

The Energy labelling Regulation (EU) 2017/1369 establishes a framework for setting energy labelling regulations for energy-related products at EU level. It is a key EU policy instrument for informing consumers about the energy efficiency and other environmental performance aspects of energy-related products placed on the internal market.

The energy labelling measures applicable to household refrigerating appliances are:

– Commission Regulation (EU) No 1060/2010[1] of 28 September 2010 with regard to energy labelling requirements for household refrigeration appliances;

– as amended by Commission Delegated Regulation (EU) No 518/2014[2] of 5 March 2014 with regard to labelling of energy-related products on the internet - OJ L 147, 17/05/2014 – p 1-28 and corrigendum OJ L 244, 19.9.2015.

The revision the Energy labelling measure for household refrigerating appliances follows Article 7 of Commission Delegated Regulation (EU) No. 1060/2010. In particular, this review should assess verification tolerances and the possibilities for removing or reducing the values of the correction factors.

Furthermore, according to article 5 of Regulation (EU) 2017/1369 on Energy Labelling (EL)[3], a new delegated act for energy labelling of household refrigerating appliances must be adopted at the latest 2 November 2018.

Moreover, there are new policies that force the revision to look beyond the strict scope mentioned in the review articles of the existing implementing and delegated acts for household refrigerating appliances: A renewed effort in carbon emission abatement through the Paris climate agreement[4], the Commission's Circular Economy[5], the Better Regulation policy aiming at more efficient and effective legislation[6] [7], the diesel-gate scandal stressing the need to deeper scrutinise legislation further on the possibilities for circumvention, etc.[8]

General context

In 2014, the Commission conducted an 'Omnibus' review[9] of several product groups that indicated that there is still a large untapped saving potential for household refrigerating appliances making the regulations eligible for a revision. This was confirmed by the review study, concluded in March 2016[10].

A full impact assessment, including possible alternative scenarios that might come up at the Consultation Forum, will be performed at a later stage. For the moment, the proposal is in line

[1] OJ L 314 of 30.11.2010, p 17-46
[2] OJ L 147, 17.5.2014, p. 1–28
[3] OJ L 198, 28.7.2017, p. 1–23.
[4] http://ec.europa.eu/clima/policies/international/negotiations/future/index_en.htm
[5] Closing the loop - An EU action plan for the Circular Economy". COM(2015) 614 final, Brussels, 2.12.2015
[6] https://ec.europa.eu/info/law/law-making-process/overview-law-making-process/evaluating-and-improving-existing-laws/reducing-burdens-and-simplifying-law/refit-platform_en
[7] http://ec.europa.eu/smart-regulation/better_regulation/key_docs_en.htm#_br
[8] http://www.europarl.europa.eu/committees/en/emis/home.html
[9] 'Omnibus' Review Study on Cold Appliances, Washing Machines, Dishwashers, Washer-Driers, Lighting, Set-top Boxes and Pumps, consortium of VHK, VITO, Viegand Maagøe, Wuppertal Institut für Klima, Umwelt, Energie for the European Commission, DG ENER-C3, Brussels/Delft, April 2014.
[10] VHK and Armines, Preparatory Review Study Household Refrigeration Appliances, for the European Commission, Brussels/Delft, 4 March 2016.

with the preliminary scenario analysis in the review study showing the following savings in 2030, in addition to the savings that can be expected under a Business-as-Usual (BAU) scenario. Savings LLCC 2030 vs. BAU 2030:

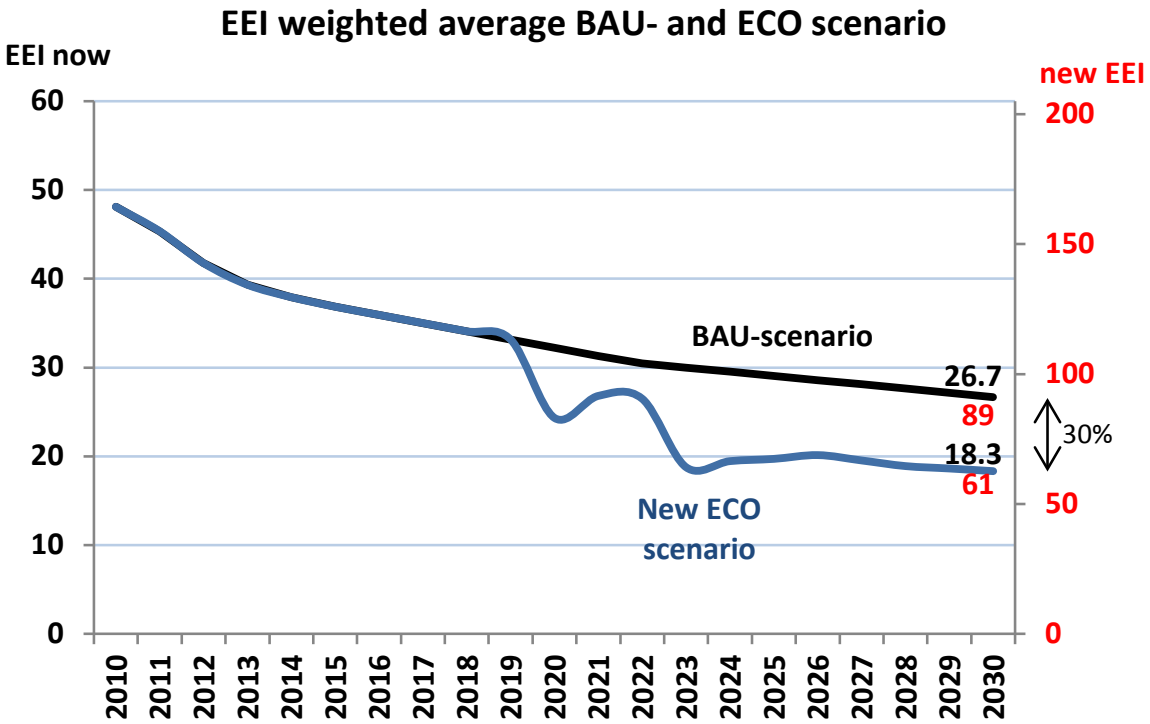
- 10 TWh/a electricity
- 3.2 Mt CO2 eq. /a in greenhouse gas emissions
- 1-1.2 billion Euro net consumer expenditure/a

The total absolute savings over the period 2015 until 2030, with the implementation of the new measures, amount to 38 TWh electricity per year and 18 Mt CO2 eq. GHG per year.

The figure below revisits the projections in the preparatory study using the latest industry data and projections as outlined in Figure 2 and Table 1.

Figure 1

Projections of savings following projections in Table 1.



Note that the slight bump in the 2021-2022 is a result of following the calculation model to the letter. In reality a smoother transition is expected.

At technical level, there is the introduction of a new global IEC test standard for refrigerators and freezers that can make a significant contribution in achieving many of the above-mentioned policy objectives[11]. It is faster, more effective and more efficient for both industry and market surveillances authorities, but it does require a new set-up of Ecodesign and Energy Labelling regulations as well as the harmonised standards behind them.

[11] IEC 62552:2015, Household refrigeration appliances – Characteristics and test methods, Parts 1, 2 and 3.

The metrics used in the existing Ecodesign and Energy Labelling regulations for household refrigerating appliances were developed 25 years ago. Since then there has been considerable technological progress, which is no longer reflected in today's metrics for efficiency levels that are >60% lower than 25 years ago. Furthermore, the appliance-based approach is complex in the legislation and unnecessarily rigid.

The current regulation includes correction factors for climate-class (1.1 for sub-tropical ST and 1.2 for tropical T), no frost (1.2), built-in appliances (1.2) and the bonus for the chill compartment (50 kWh at EEI=100). Some of these factors are used as (legal) loopholes and are obscuring the real electricity consumption and efficiency for the end-consumer.

Preliminary findings show that there are considerable benefits in proposing a revision of the current regulation, both in terms of optimising regulatory aspects as in realising additional energy-, CO_2 emission- and monetary savings. As such, a revised regulation would be more effective by supporting global test standards, addressing the outdated metrics and updating the correction factors. The proposed review would also improve the efficiency of the legislation: verifiable exemptions and allowances are needed, and clear and more ambitious efficiency targets are possible.

2. CONSULTATIONS PRIOR TO THE ADOPTION OF THE ACT

Consultation of interested parties

The review process started in 2013 with the Omnibus review study covering multiple product groups amongst which were household refrigerating appliances. The Omnibus review involved bilateral stakeholder consultation and was published in April 2014, i.e. one month before it was discussed in a subsequent Consultation Forum (CF). At the CF it was decided to go ahead with a preparatory review study for the product group. This preparatory study took place from January 2015 until March 2016 (publication date). Stakeholders were informed and consulted through a project website www.ecodesign-fridges.eu, currently still on-line, bilateral meetings and expert interviews as well as two stakeholder meetings at the Commission's premises with over 40-50 participants each. The process was then interrupted for over a year due to uncertainties regarding the new Energy Labelling Regulation and the proposed working plan. During that time the complementary research on the role of household refrigeration, published in March 2017, was performed. In the late spring of 2017 bilateral consultations with experts from industry, NGOs and Member States resumed, involving amongst others input to early drafts of the proposal.

The draft WD and Explanatory Memorandum will be sent out to stakeholder one month before the upcoming Consultation Forum of 6 December.

Impact Assessment

An impact assessment is being prepared to support the preparation of this initiative and to inform the Commission's decision.

The following figure and table shows an initial estimation of the impact of the proposed regulation on household refrigerating appliances, excluding wine storage appliances. It is based on the number of models that are available with a certain EEI and is not coupled to sales data.

The number of models (in %) in a certain energy efficiency class over the period 2010-2030 are shown in Table 1. The figures from 2010 until 2016 are based on actual data and figures from 2017 until 2030 are based on projections.

Table 1

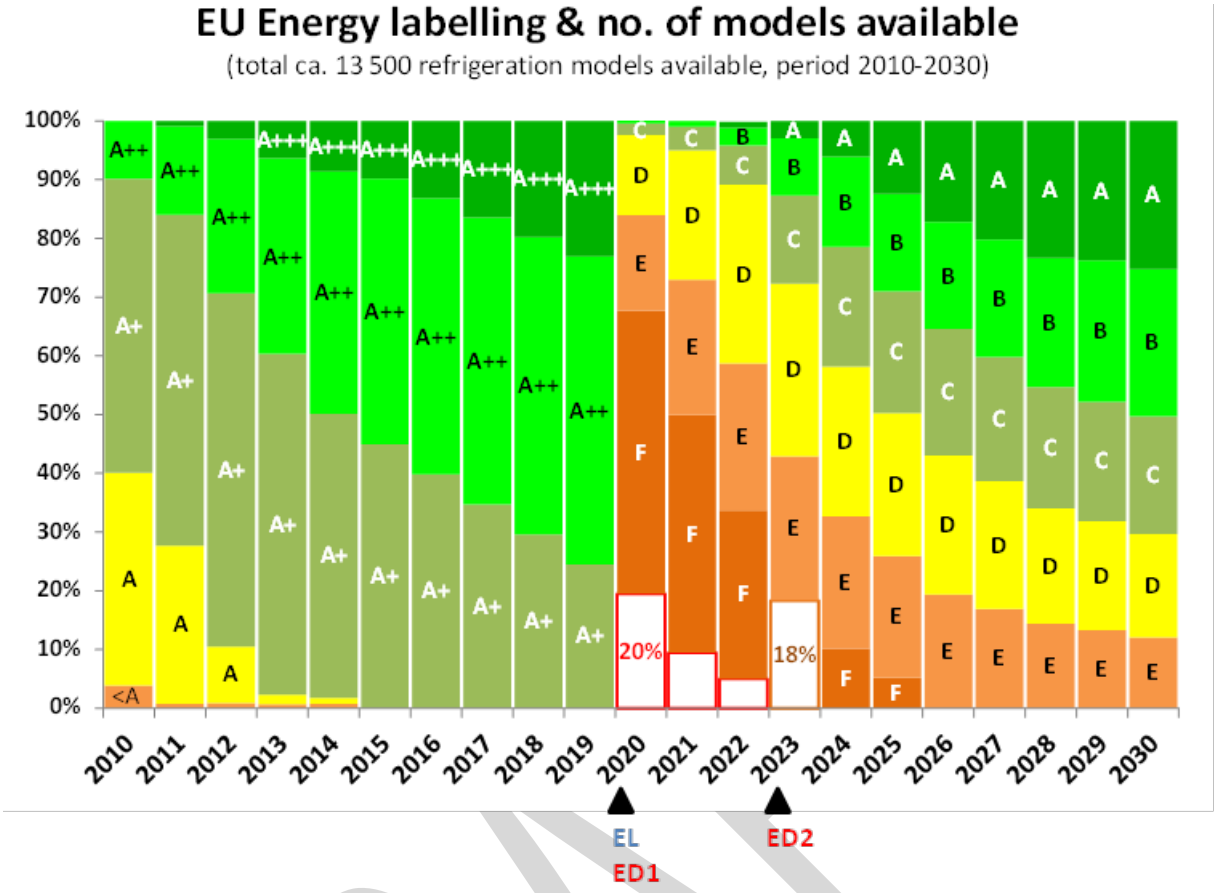
Energy label class distribution and EEI of household refrigerating appliances EU 2010-2030

			% of models									
	Year		2010	2011	2012	2013	2014	2015	2016	2017	2018	2019
	EEI	class										
EEI according to 643/2009 & 1060/2010	EEI≤22	A+++	0.0%	0.9%	3.1%	6.4%	8.6%	9.9%	13.2%	16.5%	19.8%	23.1%
	22 ≤EEI<33	A++	9.9%	15.1%	26.3%	33.3%	41.3%	45.2%	47.0%	48.8%	50.6%	52.4%
	44≤EEI<55	A+	50.0%	56.3%	60.1%	58.0%	48.3%	44.9%	39.8%	34.7%	29.6%	24.5%
	55≤EEI<75	A	36.2%	26.9%	9.6%	1.6%	1.0%					
	EEI≥75	<A	3.9%	0.8%	0.9%	0.7%	0.8%					
EEI according to this proposal	EEI≤41	A										
	41<EEI≤51	B										
	51<EEI≤64	C							0.4%	0.5%	0.6%	0.7%
	61<EEI≤80	D							12.8%	16.0%	19.2%	22.4%
	80<EEI≤100	E							5.3%	5.5%	5.7%	10.0%
	100<EEI≤125	F							42.0%	44.0%	45.0%	42.0%
	EEI>130	G							40.0%	35.0%	30.0%	25.0%
	Average EEI according to 643/2009 & 1060/2010		48.1	45.3	41.8	39.3	37.9	36.9	35.9	35.0	34.1	33.2
	Average EEI according to this proposal								117	116	113	110

			% of models									
	EEI	class	2020	2021	2022	2023	2024	2025	2026	2027	2028	2029	2030
EEI according to 643/2009 & 1060/2010	EEI<22	A+++											
	22 ≤EEI<33	A++											
	44≤EEI<55	A+											
	55≤EEI<75	A											
	EEI≥75	<A											
EEI according to this regulation	EEI≤41	A			1.0%	2.0%	6.1%	12.4%	17.2%	20.2%	23.4%	23.8%	25.3%
	41<EEI≤51	B	0.4%	1.0%	3.0%	9.7%	15.3%	16.6%	18.3%	20.0%	22.0%	24.0%	25.0%
	51<EEI≤64	C	2.0%	4.0%	6.8%	15.0%	20.4%	20.7%	21.5%	21.2%	20.6%	20.4%	20.1%
	61<EEI≤80	D	23.0%	27.0%	30.4%	32.0%	25.5%	24.4%	23.7%	21.7%	19.6%	18.6%	17.6%
	80<EEI≤100	E	15.0%	18.0%	25.0%	23.0%	22.4%	20.7%	19.4%	16.9%	14.4%	13.2%	12.1%
	100<EEI≤125	F	40.0%	40.4%	28.7%	18.3%	10.2%	5.2%					
	EEI>130	G	19.5%	10.0%	5.0%								
	Average EEI according to 643/2009 & 1060/2010		*24.4*	*26.8*	*26.5*	*18.8*	*19.5*	*19.7*	*20.1*	*19.5*	*18.9*	*18.6*	*18.3*
	Average EEI according to this proposal		81	89	88	63	65	66	67	65	63	62	61

Following to this Table, a maximum EEI of 125 in 2020, would ban 20% of the models from the market in 2020; a maximum EEI of 100 in 2023, would ban 18% of the models from the market in 2023.

This is represented graphically in Figure 2.



3. LEGAL ELEMENTS OF THE DELEGATED ACT

Summary of the proposed action

1. Definition of the scope and updated definitions

The scope of the measures is standard electric (230V) household refrigerating appliances with a volume up to 1500 l, placed in the homes of EU citizens and based on compressor technology.

The current review tries to find solutions for the following ambiguities in the scope:

– whether refrigerating appliances intended for non-household use that are equivalent to refrigerating appliances intended for household use are in the scope of the Regulation or not. This leads to the potential placing on the market of inefficient products by allowing them to be indicated as intended for use in a non-household environment thus escaping the minimum efficiency requirements;

– Whether refrigerating appliances using technologies other than those making use of a compressor (such as absorption, thermo-electric and possibly future innovations such as magnetic cooling or thermo-acoustics) and as a result have lower energy performances, but which have unique functional characteristics in terms of e.g. low noise or mobility. Current requirements could bann some of these products with unique functionalities from the European market.

– Possible overlap with related existing or planned Energy labelling regulations that were not considered when Regulation (EC) 643/2009 was adopted.

The review proposal tries to limit these ambiguities as much as possible, defining first the large functional and technology-neutral categories and expanding on what is in the scope and what is not.

In the scope are refrigerating appliances intended for household use and refrigerating appliances equivalent to those intended for household use, used in non-household environments; and low noise refrigerating appliances that have added functionality and thus different Ecodesign limits. Nonetheless, the same energy label and scale will be used, as to inform consumers about their lower energy performance.

The low-noise appliances, currently using absorption and thermo-electric ('Peltier') technology, include most mini-bars in hotel (bed) rooms. They are defined as refrigerating appliances up to a volume of 60 litres and a noise level of no more than 20 dB(A). The performance will be that of a single cellar (+12°C) or pantry (+17°C) compartment.

Distinguishing features of products in the scope include mass-produced, thermally insulated cabinets with a fully integrated and factory-sealed cooling circuit, including one or more cold generators. In other words, custom-made cabinets or cabinets with remote condensing unit or cooled by remote process chillers are excluded.

Out of the scope are commercial refrigerating, professional refrigerating and mobile refrigerating appliances.

Commercial refrigerating appliances, for which a draft Working Document was presented to the Consultation Forum, are characterised by refrigerated display of products for sale ('merchandise'). The display function means transparent doors or open access for one or more sides of the appliance. For instance, wine storage appliances or hotel mini-bars with a display functionality can thus rightfully claim to be 'commercial' and thus out of the scope of the 'household' requirements. This avoids loopholes, e.g. where wine storage appliances with a glass door in restaurants show large similarities with vertical display cabinets in the retail sector. It keeps the display functionality in the market place where it really matters, i.e. in the commercial sector.

Regulation (EU) 2015/1095 on professional refrigerating appliances, defines 'professional' as a rest group (non-household and non-commercial).

'Mobile' appliances are designed for use in means of transport (cars, mobile homes, boats, etc.), where there may be no access to the main electric grid and thus have to use battery-power of the transport vehicle (12 V) or a gas/kerosene tank. They are more resistant to mechanical vibration and shocks as well as operation in a tilted position.

2. Measurements and calculations

The metrics of the Ecodesign and Energy Labelling regulations for household refrigerating appliances is in need for a number of compelling reasons regarding globalisation, technological progress and transparency.

Globalisation

Over the last years experts the global refrigeration industry have been working to create a global standard for household refrigerating appliances. This global standard, IEC 62552:2015, was published in 2015 and will be used in MEPS (Minimum Energy efficiency Performance Standards, like the minimum efficiency requirements in Ecodesign) and Energy Labelling in Australia, Japan, China and –in due time—also North America. It aims not only to be universally applicable, using local variables but always in a globally harmonised context, but also to improve the efficiency (faster, lower costs), accuracy (more sophisticated defrost testing) and reliability (fighting loopholes, precise indications of relevant testing) of

refrigerating appliance testing. Using this standard, adapted to the EU situation, in Ecodesign and Energy Labelling is thus crucial for global competitiveness but also for better market surveillance and lowering the administrative burden for industry. Most of the definitions in the proposed regulation stem from this new global standard. As regards quantitative test- and calculation methods the annotated version gives the details. Most important changes are:

– Energy testing at two ambient temperature conditions, 16 and 32 degrees, taking the average (24 °C) as a reference. This gives a better impression of real-life performance instead of design-optimisation for the current single ambient temperature testing at 25 °C. The new 24 °C reference was found to be yield results closest to the current practice.

– Fresh food compartment temperature is now +4 °C, instead of +5 °C, because it is better for food preservation. This leads to an increase in energy consumption for fresh food compartments (+11.9%).

– Freezer temperature (-18oC for 3- and 4 star) is established by measuring the air temperature, i.e. longer measured inside test-packages. This is faster, but will lead to a decrease (-6%) in energy consumption for these compartments due to the temperature difference inside and outside the packages. For an upright freezer the increase will be -1.8% with auto-defrost and -4.7% without auto-defrost. For a chest freezer the decrease will be -6%.

– Combining the above two points for a typical refrigerator-freezer the increase in energy consumption will 12.7% for a single thermostat design ('Type I') and 3.6% with auto-defrost or 1.6% without auto-defrost for a combi with two thermostats ('Type II').

– The standard sets target temperature for testing chill compartments is no longer 0 °C but at 2 °C. Note that, because the N and M factors are more favourable for chill than for fresh food compartments, this opens the possibility of loopholes and thus in the regulation and/or harmonised standard the chill compartment will have to comply with very strict performance requirements.

– Testing is no longer based on fixed 24 hour period (or more), but testing continues until well-defined steady state conditions are achieved.

– The energy consumption for defrosting (including recovery to set temperature) is measured separately, and will be added ex-post to steady state energy consumption as appropriate. It is no longer integrated in the 24 h test, thus also allowing more accurate monitoring. Testing now accommodates several types of defrosting control mechanisms.

– Test institutes involved in compliance testing are explicitly obliged to investigate anomalies that might be caused by attempts to circumvention and report circumvention to the market surveillance authorities. This stipulation is important in the light of the fact that, following widespread privatisation of test institutes in the EU over the last decades, almost all test institutes also work for the industry.

Technological progress

The metrics in the current (and preceding) regulations for Ecodesign and Energy Labelling of household refrigerating appliances were developed 25 years ago, using parameters (the N, M and correction factors) that were derived from an analysis of the trends in a commercial database from the early 1990s. Since then there has been considerable technological progress, which is not (no longer) reflected in today’s metrics for efficiency levels that are >60% lower

than 25 years ago. For instance, the reference line for refrigerators is almost flat, whereas –at the same index—the requirements for fridge/freezer combis are more lenient than for freezers. Furthermore, the appliance-based approach is complex in the legislation and unnecessarily rigid. In order to correct for these issues a more balanced and more flexible metric is proposed, mainly based on physics rather than only commercial trends. The proposed approach is primarily compartment-based, allowing maximum freedom of design. The 10 different appliance categories have been eliminated; what remains of the current appliance categorisation is a variable 'combi-factor' at a default value of 1.15 if more than one compartment type is used and a variable value between 1.3 and 1.56 for fridge freezers.

Transparency

For many years, NGOs and Member States have asked for the elimination or at least drastic reduction of the correction factors for climate-class (1.1 for sub-tropical ST and 1.2 for tropical T), no frost (1.2), built-in appliances (1.2) and the bonus for the chill compartment (50 kWh at EEI=100). Some of these factors are used as (legal) loopholes, e.g. leading to Sweden reportedly having more 'tropical' refrigerators than countries like Spain, and are anyway clouding the real electricity consumption and efficiency for the end-consumer. In this proposal the climate-class factor has been completely eliminated and the other correction-factors have been more than halved: 1.1 for no-frost, 1.1 (freezer) or 1.04 (fresh food) for built-in. The compensation for chill factors, which for the most common compartment sizes is anyway much lower than today, has been incorporated in the N and M factors.

Having said that, a new correction factor of 0.9 (negative impact) has been introduced for freezers to take more into account the effect of introducing and freezing the warm load in real-life. For refrigerators and combis this effect, and the effect of door-openings, this is implicitly compensated by testing at a 24 °C ambient temperature, instead of at the real-life temperature of 20 °C. Also freezers are tested at 24 °C ambient temperature, but according to a recent study by Stiftung Warentest, at the currently high efficiency levels of the freezers this is no longer enough to compensate for the real impact. This will especially be the case for freezers used in professional environments (also in the scope of this regulation) and households in rural areas.

Furthermore, a small multi-door correction has been introduced for appliances with 3, 4 or more external doors with correction factors 1.02, 1.035, 1.05 respectively. Multi-door appliances have inherently more heat losses, in the door gasket area, than single or double door appliances of the same size. As a result the energy efficiency rating for the Energy Label is lower and there is no incentive for industry to go down that route. Currently, only about 15% of models offer the possibility to store food (also) at a different temperature than 4 °C. And of these 15% which offer a combi with also a chill compartment (0 °C) probably most are actually sub-compartments that share the external door with the fresh food compartment. Although in a controlled test environment such sub-compartments may pass the performance test, in real life such a chill sub-compartment solution is complex in terms of avoiding heat exchange with the fresh food compartment and in terms of accurate temperature control. This is also true for cellar compartments (8-14 °C, reference 12 °C), which are hardly used in the current market. Chill and cellar compartments represent important storage conditions for much perishable foodstuff, leading to an extension of shelf-life with a factor 2 or 3 with respect to storage at fresh-food conditions (see Circular Economy paragraph hereafter). Furthermore, the higher-than-fresh-food temperature of a cellar compartment offers additional saving options by not only displacing part of the fresh food compartment volume but also through possible use for cold air recovery from e.g. defrosting.

The most controversial correction factor in the proposal is the one for glass doors in wine storage compartments. Wine storage compartments with closed insulated doors can be handled just as normal refrigerators, but a glass door means a significant increase in energy consumption. For Energy Labelling, where wine storage compartments are already in the scope, this poses no problems: The appliance would simply be in the lowest class ('G'). But now the review clause requires that wine storage compartments are also included in Ecodesign measures. And in any overall Ecodesign limit that makes sense for all other appliances, the wine storage compartments/-appliances would be banned from the market. In the current proposal, glass door refrigerating appliances are out of the scope, they will be taken up in the Ecodesign measure for commercial refrigerating cabinets which is intended to be published at the same time. There was a proposal for a value of 1.2 for the wine storage glass door correction factor. But industry thinks it is too little and green NGOs think there should be no glass door correction factor at all. Member States and consumer associations have so far not expressed themselves clearly on the issue and thus the Consultation Forum will be crucial in determining the way forward.

Conversion

It is impossible to make a simple calculation to convert the current metrics to the newly proposed metrics. But, as a significant part of the previous analysis --e.g. on the LLCC and others-- starts from the current Energy Efficiency Index (EEI) it is important for policy makers to get an understanding of the implications in terms of the newly proposed EEI.

For that purpose a stochastic conversion was made on the basis of the models in the most recent (2016) CECED database. The table below shows how the rounded current EEI values (first column) in that database translate into the average, minimum, maximum and standard deviation values according to the new index. This is done for the three main categories in the data-base: refrigerators (Cat. 1), refrigerator-freezer combis (Cat. 7) and the upright freezers (Cat. 8).

Table 2

Conversion from current to newly proposed EEI

(source: analysis based on 2016 CECED database)

Category-->		***1. Fridge***				***7. Combi***				***8. Upright freezer***				***Model count*** *(total 12493)*		
EEI now		Avg	*Min*	*Max*	*Stdev*	Avg	*Min*	*Max*	*Stdev*	Avg	Min	Max	Stdev	1	7	8
42	***A+***	**140**	*130*	*150*	*1.8%*	**143**	*123*	*177*	*7.2%*	**130**	92	147	7.5%	642	3243	589
41		**141**	*133*	*143*		**135**	*133*	*159*		**117**	100	125		20	116	10
40		**132**	*132*	*132*		**134**	*120*	*143*		**123**	111	123		2	144	1
39		*128*				**129**	*117*	*144*		*119*				0	52	0
38		*125*				**130**	*119*	*133*		**116**	82	107		0	51	2
37		*121*				**134**	*131*	*138*		*113*				0	38	0
36		*117*				**129**	*128*	*130*		*111*				0	16	0
35		*113*				**120**	*111*	*128*		*109*				0	34	0
34		**110**	*110*	*110*		**120**	*120*	*120*		*108*				1	14	0
33	***A++***	**109**	*105*	*115*	*1.6%*	**113**	*89*	*139*	*7.0%*	**107**	75	118	7.0%	848	4564	311
32		**108**	*106*	*109*		**113**	*95*	*138*		**100**	86	105		9	58	6
31		*104*				**111**	*92*	*114*		**82**	74	82		0	17	1
30		*100*				**95**	*92*	*113*		*98*				0	35	0
29		**95**	*95*	*95*		**107**	*107*	*107*		*94*				1	1	0
28		*92*				*104*				*91*				0	0	0
27		*89*				*100*				*88*				0	0	0
26		*85*				*96*				*84*				0	0	0
25		*81*				*92*				*81*				0	0	0
24		*79*				*88*				*79*				0	0	0
23		*75*				**76**	*74*	*76*		*77*				0	5	0
22	***A+++***	**72**	*72*	*77*	*1.5%*	**74**	*65*	*92*	*7.8%*	**73**	56	78	5.9%	106	1454	54
21		*69*				**71**	*69*	*75*		**66**				0	18	0
20		*65*				**65**	*61*	*71*		**58**	52	58		0	8	1
19		*61*				**64**	*60*	*68*		*54*				0	2	0
18		**57**	*57*	*57*		**56**	*55*	*58*		*51*				1	18	0
17		*54*				*52*				*48*				0	0	0
weighted average														***total***		
New EEI		**119**	*113*	*126*	*1.6%*	**118**	*98*	*144*	*7.2%*	**107**	84.3	133	7.3%	1630	9888	975
EEI now (2016)		**35.9**				**34.5**				**37.8**						

Average values in small italic font are interpolations estimated from available values.

3. Energy labelling requirements

We propose a progressive, rather than a fixed class width. Taking into account the Stage 2 Ecodesign limit at the class limit between E and F (EEI=100), a BAT level between B and C of around EEI=48 to 54, we come to a progression of 20%. This means that every higher labelling class means that the appliances will become 20% more efficient.

Table 2. Proposed lower class limits for EU Energy Label (implementation April 2020)

A	B	C	D	E	F	G
≤41	≤51	≤64	≤80	≤100	≤125	>125

For wine storage appliances (current category COLD2)

As of the introduction of the label in April 2020 the G-class for standard appliances will be phased out at implementation. However, the G-class will still be populated with low-noise and wine storage appliances. In April 2023 the F-class will be phased out for standard appliances.

The graphs at the end of this memorandum illustrate the classification against a backdrop of the distribution in the 2016 CECED database.

COMMISSION DELEGATED REGULATION (EU) …/...

of XXX

supplementing Regulation (EU) 2017/1369 of the European Parliament and of the Council with regard to energy labelling of household refrigerating appliances and low noise refrigerating appliances

repealing
Regulation (EU) No 1060/2010 with regard to energy labelling of household refrigerating appliances

(Text with EEA relevance)

THE EUROPEAN COMMISSION,

Having regard to the Treaty on the Functioning of the European Union,

Having regard to 2017/1369 of the European Parliament and of the Council of 28 July 2017 setting a framework for energy labelling[12] repealing Directive 2010/30/EU, and in particular Articles 11 and 16 thereof,

Whereas:

(1) Regulation 2017/1369 empowers the Commission to adopt delegated acts as regards the labelling or rescaling of the labelling of product groups representing significant potential for energy savings and, where relevant, other resources.

(2) Provisions on the energy labelling of household refrigerating appliances were established by Commission Delegated Regulation (EU) No. 1060/2010 of 28 September 2010 supplementing Directive 2010/30/EU[13].

(3) Household refrigerating appliances are among the product groups mentioned in Article 11(5)(b) of Regulation (EU) 2017/1369 for which the Commission should adopt a delegated act introducing an A to G rescaled label.

(4) Regulation (EU) 1060/2010 contains a review clause in Article 7 requiring the Commission to review the regulation in light of technological progress.

(5) The Commission has reviewed Regulation (EU) 1060/2010 and analysed technical, environmental and economic aspects of household refrigerating appliances as well as real-life user behaviour. The review was undertaken in close cooperation with stakeholders and interested parties from the Union and third countries. The results of the review were made public and presented to the Consultation Forum established by Article 14 of Regulation (EU) 2017/1369.

[12] OJ L 198, 28.07.2017, p. 1.
[13] OJ L 314, 30.11.2010, p. 17

(6) The review concluded that there was a need for the introduction of revised energy labelling requirements for household refrigerating appliances and low noise refrigerating appliances.

(7) The environmental aspect of refrigerating appliances and low noise refrigerating appliances, identified as significant for the purposes of this Regulation, is energy consumption in the use phase.

(8) The electricity used by household refrigerating appliances accounts for a significant share of total household electricity demand in the Union. In addition to the energy efficiency improvements already achieved, the scope for further reducing the energy consumption of household refrigerating appliances is substantial.

(9) There is an opportunity for energy savings for products in the market of low noise refrigerating appliances. Those appliances should therefore be included in the scope of this Regulation.

(10) Low-noise refrigerating appliances represent a unique functionality as regards low noise, but consume significantly more energy than other refrigerating appliances. In order for end-users to make an informed decision, information on airborne acoustical noise emissions of household refrigerating appliances should be included on the label.

(11) Some refrigerating appliances used in non-household environments are equivalent to refrigerating appliances and should therefore be in scope of this Regulation. As an example, a professional chest freezer which is equivalent to a household chest freezer and is intended for professional use shall be in the scope of the regulation.

(12) The combined effect of the provisions set out in this Regulation and Commission Regulation 643/2009 implementing Directive 2009/125/EC of the European Parliament and of the Council with regard to ecodesign requirements for household refrigerating appliances[14], could amount to additional annual electricity savings of 10 TWh by 2030, compared to the situation if no measures were taken.

(13) The measures provided for in this Regulation were discussed by the Consultation Forum and the Member States' experts in accordance with Article 14 and 18 Article 18 of Regulation (EU) 2017/1369.

(14) Commission Delegated Regulation (EU) No. 1060/2010 should be repealed and new provisions should be laid down by this Regulation.

HAS ADOPTED THIS REGULATION:

Article 1

Subject matter and scope

1. This Regulation establishes requirements for the labelling of, and the provision of supplementary product information on:

   (a) electric mains-operated household refrigerating appliances with a volume between 10 and 1500 litres;

   (b) electric mains-operated low-noise refrigerating appliances with a volume between 10 and 60 litres.

[14] OJ L 191, 23.07.2009, p 53

2. This Regulation shall not apply to:

(a) products covered by Commission Regulation (EU) 2015/1095 with regard to ecodesign requirements for professional refrigerated storage cabinets, blast cabinets, condensing units and process chillers;

(b) commercial refrigerating appliances;

(c) mobile refrigerating appliances.

Article 2

Definitions

In addition to the definitions set out in Article 2 of Regulation (EU) 2017/1369 and the definitions set out in Annex I of this Regulation, the following definitions shall apply for the purposes of this Regulation:

1. 'household refrigerating appliance' means a refrigerating appliance, integrating the condenser and cold generator in one package with a factory-sealed cooling circuit used in household environments. This also includes equivalent refrigerating appliances used in non-household environments such as professional chest freezers;
2. 'refrigerating appliance' means an insulated cabinet with one or more compartments that are controlled at specific temperatures below the ambient temperature;
3. ‘low noise refrigerating appliance’ is a refrigerating appliance, with noise power emission lower than 20 dB(A);
4. ‘mains’ or ‘electric mains’ means the electricity supply from the grid of 230 (±10%) Volt of alternating current at 50 Hz;
5. ‘volume’ means the volume of the space within the inside liner of the refrigerating appliance;
6. ‘commercial refrigerating appliances’ means refrigerating appliances used in non-household environments with a display- and/or payment-function to facilitate the selection and purchase of the refrigerated items. This category includes wine storage appliances and low noise refrigerating appliances with display-function;
7. ‘mobile refrigerating appliances’ means refrigerating appliances used in vehicles and/or any other means of ~~transportion~~transportation where there is no access to the mains electricity grid, that can operate reliably and safely when exposed to mechanical vibrations and a tilted position as well as use extra low-voltage electricity (<120V DC) and/or fossil fuel as the energy source for the refrigeration functionality;
8. 'wine storage appliance' means a dedicated appliance for the storage of wine, with precision temperature control as defined Annex IV, Table 3, and equipped with anti-vibration technology;
9. ‘energy efficiency index’ (EEI) means an index number for the relative energy efficiency performance of a refrigeration appliance expressed in %, as calculated in Annex IV.B;
10. ‘annual energy consumption’ (*AE*) means the average daily energy consumption multiplied with 365 (days per year) expressed in kWh, as calculated in Annex IV.B;

11. ‘compartment’ means an enclosed space within a refrigerating appliance, which is directly accessible through one or more external doors and which may itself be divided into sub-compartments having a different operating temperature range from the compartment within which it is located. For the purpose of this regulation, unless specified otherwise, ‘compartment’ refers to both compartments and/or sub-compartments;

12. ‘frozen compartments’ means the group of compartment types with a target temperature equal to or below 0°C, as set out in Annex IV, Table 3;

13. ‘chill compartment’ is a compartment type with performance requirements with a target temperature equal to 2°C, as set out in Annex IV, Table 3;

14. ‘unfrozen compartments’ means the group of compartment types with a target temperature equal to or above 4°C, as set out in Annex IV, Table 3;

15. 'cold generator' means the part of a refrigerating appliance that generates a temperature difference allowing heat to be extracted from inside the cabinet and transferred to the ambient air;

16. 'equivalent refrigerating appliance' means a model placed on the market with the same total and compartment volumes, same technical, efficiency and performance characteristics, and same compartment types as a household refrigerating appliance model placed on the market under a different commercial code number by the same manufacturer;

17. ‘display-function’ means a functionality of a refrigerating appliance to see its content, either by one or more transparent doors or by open access to at least one side of the appliance;

18. ‘payment-function’ means a functionality allowing customers to pay for and acquire merchandise that is stored inside the refrigerating appliance;

19. ‘external door’ is the part of a cabinet that can be opened, moved or removed to at least be able to insert the load from the exterior to the interior and extract the load from the interior to the exterior of the cabinet;

20. ‘compartment type’ means the declared compartment type in accordance with the parameters as set out in Annex IV, Table 3;

21. ‘target temperature’ (Tc) means the reference temperature inside a compartment c during testing as set out in Annex IV, Table 3, and relates to the maximum temperature for testing energy consumption and is the average over time and over a set of sensors;

22. 'compartment volume' means the volume of the space within the inside liner of the compartment;

23. ‘c’ means the index number suffix for a compartment type in an appliance.

Article 3

Obligations of the suppliers

~~From 01 April 2020 i~~In addition to the obligations of suppliers laid down in Regulation (EU) 2017/1369

1. From 01 April 2020, suppliers shall ensure that:

(a) each household refrigerating appliance, except for wine storage appliances, is supplied with a printed label in the format as set out in point 1.1 of Annex II;

(b) each wine storage appliance and each low noise refrigerating appliance is supplied with a printed label in the format as set out in point 1.2 of Annex II;

(c) the parameters of the product information sheet, as set out in Annex V, are entered into the product database;

(d) if requested by the dealer, the product information sheet shall be made available in printed form;

(e) the content of the technical documentation uploaded into the product database shall be according to Annex VI;

(f) any visual advertisement for a specific model of household refrigerating appliance or low noise refrigerating appliance, including on the internet, contains the energy efficiency class and the range of efficiency classes available on the label, in accordance with Annex X;

(g) any technical promotional material concerning a specific model of household refrigerating appliance or low noise refrigerating appliance, including on the internet, which describes its specific technical parameters includes the energy efficiency class of that model and the range of efficiency classes available on the label, in accordance with Annex X;

(h) an electronic label in the format and containing the information as set out in point 1.1 of Annex II for each household refrigerating appliance, except for wine storage appliances, and point 1.2 of Annex II for each wine storage appliance and each low noise appliance shall be made available to dealers on request;

(i) an electronic product information sheet as set out in Annex V shall be made available to dealers for each household refrigerating appliance or low noise refrigerating appliance;

(j) products are not placed on the market products that have been designed so that a model's performance is automatically altered in test conditions with the objective of reaching a more favourable level for any of the parameters specified in the relevant delegated act or included in the documentation provided with the product.

2. From 01 April 2023, suppliers shall ensure that:

(a) each household refrigerating appliance, except for wine storage appliances, is supplied with a printed label and an electronic label shall be made available in the format as set out in point 2 of Annex II. Article 4.

(b) an electronic label in the format and containing the information as set out in point 2 of Annex II for each household refrigerating appliance, except for wine storage appliances, shall be made available to dealers;

3. The energy efficiency class shall be based on the Energy Efficiency Index in accordance with Annex II.

Obligations of dealers

In addition to the obligations of dealers laid down in Regulation (EU) 2017/1369, dealers shall ensure that:

(a) each household refrigerating appliance and each low noise refrigerating appliance, at the point of sale, bears the label provided by suppliers in accordance with Article 3(a) displayed on the outside of the front or top of the household refrigerating appliance or low noise refrigerating appliance, in such a way as to be clearly visible;

(b) the label and product information sheet are provided in case of distance selling in accordance with Annexes VII and VIII;

(c) any visual advertisement for a specific model of household refrigerating appliance or low noise refrigerating appliance contains the energy efficiency class and the range of efficiency classes available on the label in accordance with Annex X;

(d) any technical promotional material concerning a specific model of household refrigerating appliance or low noise refrigerating appliance, including on the internet, which describes its specific technical parameters includes the energy efficiency class of that model and the range of efficiency classes available on the label, in accordance with Annex X.

Article 5

Measurement methods

The information to be provided pursuant to Articles 3 and 4 shall be obtained by reliable, accurate and reproducible measurement and calculation methods, which take into account the recognised state-of-the-art measurement and calculation methods, as set out in Annex IV.

Article 6

Verification procedure for market surveillance purposes

Member States shall apply the procedure laid down in Annex IX when assessing the conformity of the declared energy efficiency class, the annual energy consumption, the sum of the volumes of the frozen compartments, the sum of the volumes of the chill compartments and the sum of the volumes of the unfrozen compartments and the airborne acoustic noise emissions.

Article 7

Revision

The Commission shall review this Regulation in the light of technological progress and present the results of this review to the Consultation Forum no later than five years after its entry into force. The review shall in particularly assess the possibility to introduce requirements on circular economy.

In addition, the Commission shall review the label to rescale it when the requirements in Article 11 of Regulation (EU) 2017/1369 are met.

Article 8

Repeal

Commission Delegated Regulation (EU) No. 1060/2010 is repealed as from 31 March 2020.

Article 9

Entry into force and application

1. This Regulation shall enter into force on the 20th day following its publication in the official Journal of the European Union.

2. It shall apply from 01 April 2020.

3. The obligation in Article 3(1)(a) and (b) shall apply 4 months before 01 April 2020.

This Regulation shall be binding in its entirety and directly applicable in all Member States.

Done at Brussels,

For the Commission
Jean-Claude JUNCKER
The President

DRAFT ANNEXES
of

COMMISSION DELEGATED REGULATION (EU) …/...

supplementing Regulation (EU) 2017/1369 of the European Parliament and of the Council with regard to energy labelling of household refrigerating appliances and low noise refrigerating appliances

repealing
Regulation (EU) No 1060/2010 with regard to energy labelling of household refrigerating appliances

This draft has not been adopted or endorsed by the European Commission. Any views expressed are the preliminary views of the Commission services and may not in any circumstances be regarded as stating an official position of the Commission. The information transmitted is intended only for the Member State or entity to which it is addressed for discussions and may contain confidential and/or privileged material.

ANNEX I

Definitions applicable for Annexes I to X

In addition to the definition set out in Regulation (EU) 2017/1369 and the definitions set out in Article 2 of this Regulation, the following definitions apply:

(1) ‘model identifier’ means the code, usually alphanumeric, which distinguishes a specific refrigerating appliance model from other models with the same trade mark or supplier’s name;

(2) ‘dedicated appliance’ means a refrigerating appliance with only one type of compartment;

(3) 'through-the-door device' means a device that dispenses chilled or frozen load on demand from a household refrigerating appliance, through an opening in its external door and without opening that external door. Examples are ice-cube dispensers or chilled water dispensers;

(4) ’variable temperature compartment' means a compartment intended for use as two (or more) alternative compartment types (e.g. 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 (e.g. a chill compartment that may also fulfil zero-star requirements) is not a variable temperature compartment;

(5) 'two-star section' means part of a three-star or four-star compartment which does not have its own individual access door or lid and in which the temperature is not warmer than −12 °C;

(6) ‘minimum temperature’ (T_{min}) means the minimum temperature inside a compartment during testing and relates to the minimum temperature for testing energy consumption (average over time and over a set of sensors) or the instantaneous values over the test period, as set out in Annex IV, Table 3;

(7) ‘maximum temperature’ (T_{max}) means the maximum temperature inside a compartment during testing and relates to the maximum temperature for testing energy consumption (average over time and over a set of sensors) or the instantaneous values over the test period, as set out in Annex IV, Table 3;

(8) ‘4-star’ means a rating for a freezer compartment that fulfils the storage conditions indicated in Annex IV, Table 3 and also fulfils a minimum specific freezing capacity requirement that entails that the temperature of the light load is brought down from +25 to −18 °C within 24 hours. If the minimum freezing capacity cannot be guaranteed at all times within the ambient temperature operating range indicated by the manufacturer or importer, a 4-star rating does not apply;

(9) ‘defrost and recovery period’ means the period from the initiation of a defrost control cycle until stable operating conditions are established; ‘total average steady state power consumption’ (P_{ss}) means the average power consumption in steady state conditions expressed in W, as determined in accordance with Annex IV;

(10) ‘incremental defrost and recovery energy consumption’ ($\Delta E_{d\text{-}f}$) means the extra average energy consumption for a defrost and recovery operation expressed in Wh, as determined in accordance with Annex IV;

(11) ‘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;

(12) ‘defrost interval’ ($t_{d\text{-}f}$) 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 h;

(13) 'average power consumption' (P) means the average rate of energy consumption of a refrigerating appliance for a specific test condition or operation expressed in Watts;

(14) ‘temperature control cycle’ (TCC) means definite repetitive swings in temperature caused by operation of a temperature control device (on/off or otherwise). The period of a temperature control cycle is the time between a control event and its repetition on the next cycle. Where the control events cannot be discerned, the period of a temperature control cycle is the time between two successive temperature warmest points or two successive temperature coldest points. If no repetitive pattern can be distinguished, ‘fixed time slices’ can be used to establish whether steady state conditions are fulfilled;

(15) ‘fixed time slice’ means a fixed length period of no less than a minimum number of hours as set out in Annex III.3(2) that may be used as an alternative to using TCCs in defining a block of test data, e.g. in case there are no discernible changes in temperature or power consumption over time;

(16) ‘combi appliance’ means a refrigerating appliance that has more than one compartment type, except in the case of a freezer (3- or 4-star) compartment featuring also a two-star section or sub-compartment;

(17) ‘standard annual energy consumption’ (*SAE*) means the reference annual energy consumption of a refrigeration appliance expressed in kWh, as determined in accordance with Annex IV;

(18) ‘manual defrost’ means not having an auto-defrost feature;

(19) ‘standard annual energy consumption’ (*SAE*) means the reference annual energy consumption of a refrigeration appliance expressed in kWh, as determined in accordance with Annex IV;

(20) 'daily energy consumption' (E_{daily}) means the electricity used by a refrigerating appliance over 24 hours at reference conditions expressed in kWh/24h, as determined in accordance with Annex IV;

(21) ‘thermodynamic factor’ (r_c) means the temperature difference between the target temperature T_c of compartment c and the reference ambient temperature at +24 °C, expressed as a ratio of the same difference for a fresh food compartment at +4 °C, following the expression $r_c = (24-T_c)/20$;

(22) 'M_c' *and* 'N_c' are parameters that take into account the volume-dependence of the energy use, with values as set out in Annex IV, Table 4;

(23) 'auto-defrost factor' (A_c) means a compensation factor for frozen compartments, with values as set out in Annex IV, Table 4;

(24) 'built-in factor' (B_c) means a compensation factor for built in appliances, with values as set out in Annex IV, Table 4;

(25) 'combi factor' (C) means a compensation factor for the energy consumption related to controlling the cooling of multiple compartment types; with values as set out in Annex IV, Table 4;

(26) 'door heat loss factor' (D) means a compensation factor for combi-appliances with more than two external doors with values as set out in Annex IV, Table 4;

(27) 'load factor' (L) means a compensation factor 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 set out in Annex IV, Table 4;

(28) 'refrigerator-freezer' means a combi that has at least one freezer compartment and one or more unfrozen or chill compartments, of which one fresh food compartment;

(29) 'temperature rise time' means the time taken, after the operation of the refrigerated system has been interrupted, for the temperature in a 3- or 4-star compartment to increase from −18 to −9 °C expressed in h;

(30) 'climate class' is the range of ambient temperatures in which the appliances are intended to be used, and for which the required storage temperatures specified in Table 1 are to be met. There are four climate classes (with their acronym and ambient temperature range): 'Extended Temperate' ('SN' for +10 to +32 °C), 'Temperate' ('N' for +16 to +32 °C), 'Subtropical'('ST' for +16 to +38 °C) and 'Tropical' ('T' for +16 to +43 °C);

(31) 'built-in appliance' means any household refrigerating appliance that is designed, intended, tested and marketed exclusively:

- to be installed in cabinetry or totally encased (top, bottom, sides and back) by panels, and
- to be securely fastened to the sides, top or floor of the cabinetry or panels, and
- to be equipped with an integral factory-finished face or to be fitted with a custom front panel;

(32) 'specific freezing capacity' (x) means the rate of heat extraction by an appropriately loaded refrigeration system, 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;

(33) 'winter switch' means a control feature for a refrigerator-freezer with one compressor and one thermostat in the fresh food compartment, consisting of an appropriate sensory and switching device that activates or de-activates an artificial heat load in the fresh food compartment in order to guarantee, even if it would not be required for the fresh food compartment, that the compressor continues working to maintain the proper minimum temperature in the freezer compartment;

(34) 'fast freeze' means a reversible feature, to 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;

(35) 'display mechanism' means any screen, including tactile screen, or other visual technology used for displaying internet content to users;

(36) 'nested display' means visual interface where an image or data set is accessed by a mouse click, mouse roll-over or tactile screen expansion of another image or data set;

(37) 'tactile screen' means a screen responding to touch, such as that of a tablet computer, slate computer or a smartphone;

(38) 'alternative text' means text provided as an alternative to a graphic allowing information to be presented in non- graphical form where display devices cannot render the graphic or as an aid to accessibility such as input to voice synthesis applications.

ANNEX II

Energy efficiency classes

The energy efficiency class of a household and low-noise refrigerating appliance shall be determined on the basis of its Energy Efficiency Index (EEl) as set out in Table 1.

Table 1

Energy efficiency classes

Energy efficiency class	Energy efficiency index
A	EEI ≤ 41
B	41< EEI ≤ 51
C	51< EEI ≤ 64
D	64 < EEI ≤ 80
E	80 < EEI ≤ 100
F	100 < EEI ≤ 125
G	EEI > 125

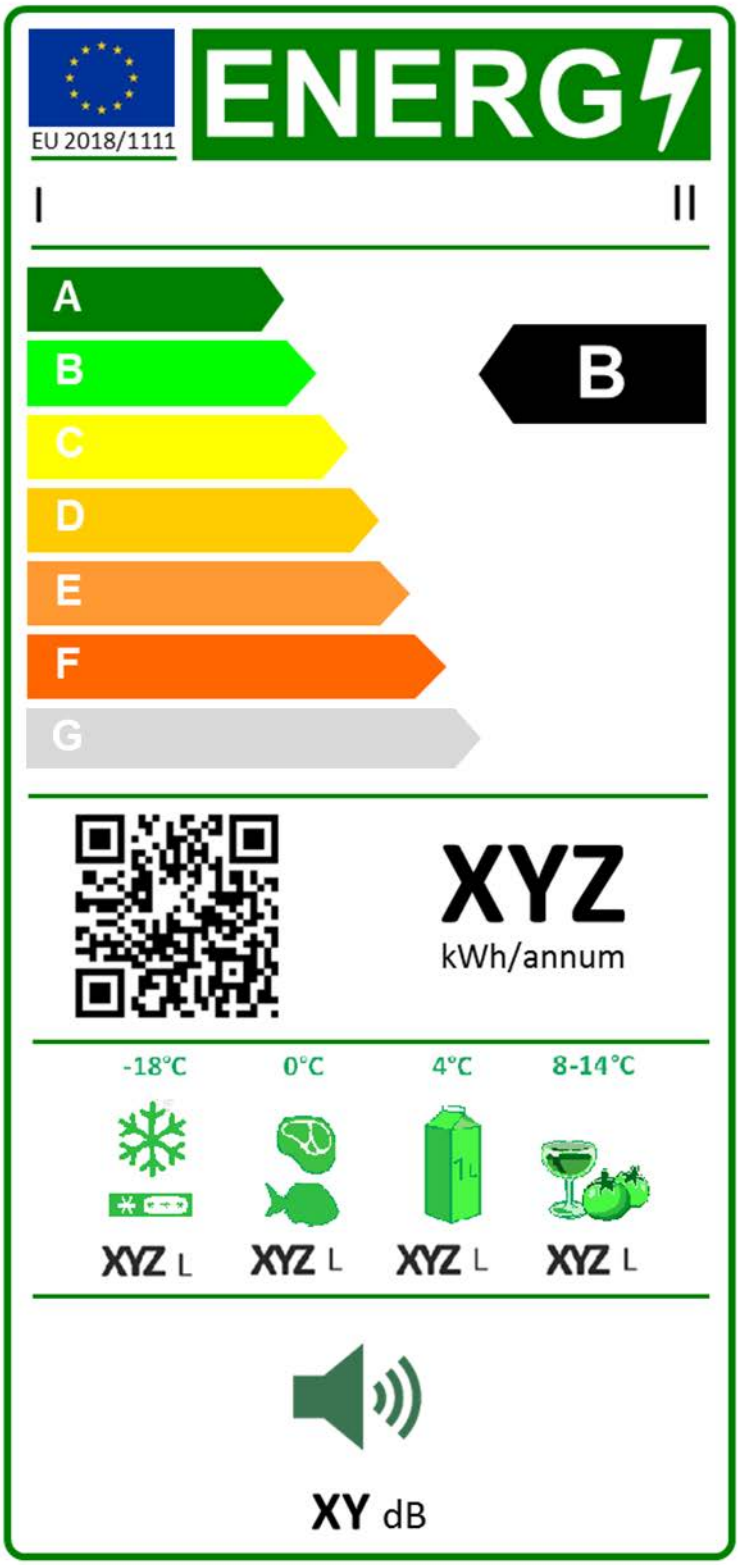
The Energy Efficiency Index of a household or low-noise refrigerating appliance shall be determined in accordance with Annexes IV.

ANNEX III

Label

1. Label 1

1.1. For household refrigerating appliances, except wine storage appliances:



I
II
III
IV
V
VI
VII
VIII
IX
X

The following information shall be included in the label:

I. supplier's name or trade mark;

II. supplier's model identifier;

III. the energy efficiency class determined in accordance with Annex II; the head of the arrow containing the energy efficiency class of the household refrigerating appliance shall be placed at the same height as the head of the arrow of the relevant energy efficiency class;

IV. QR-code linking to model information on the supplier’s website and/or the EU product database;

V. annual energy consumption in kWh per year, AE rounded up to the nearest integer and calculated in accordance with Annex IV. For dedicated freezer appliances the value of AE shall be divided by 0,9 to demonstrate the additional effect of significant quantities of warm load that are typical for these appliances;

VI. if applicable, sum of the volumes of all frozen compartments as indicated in Table 3 of Annex IV, rounded to the nearest integer;

VII. if applicable, sum of the volumes of all chill compartments as indicated in Table 3 of Annex IV, rounded to the nearest integer;

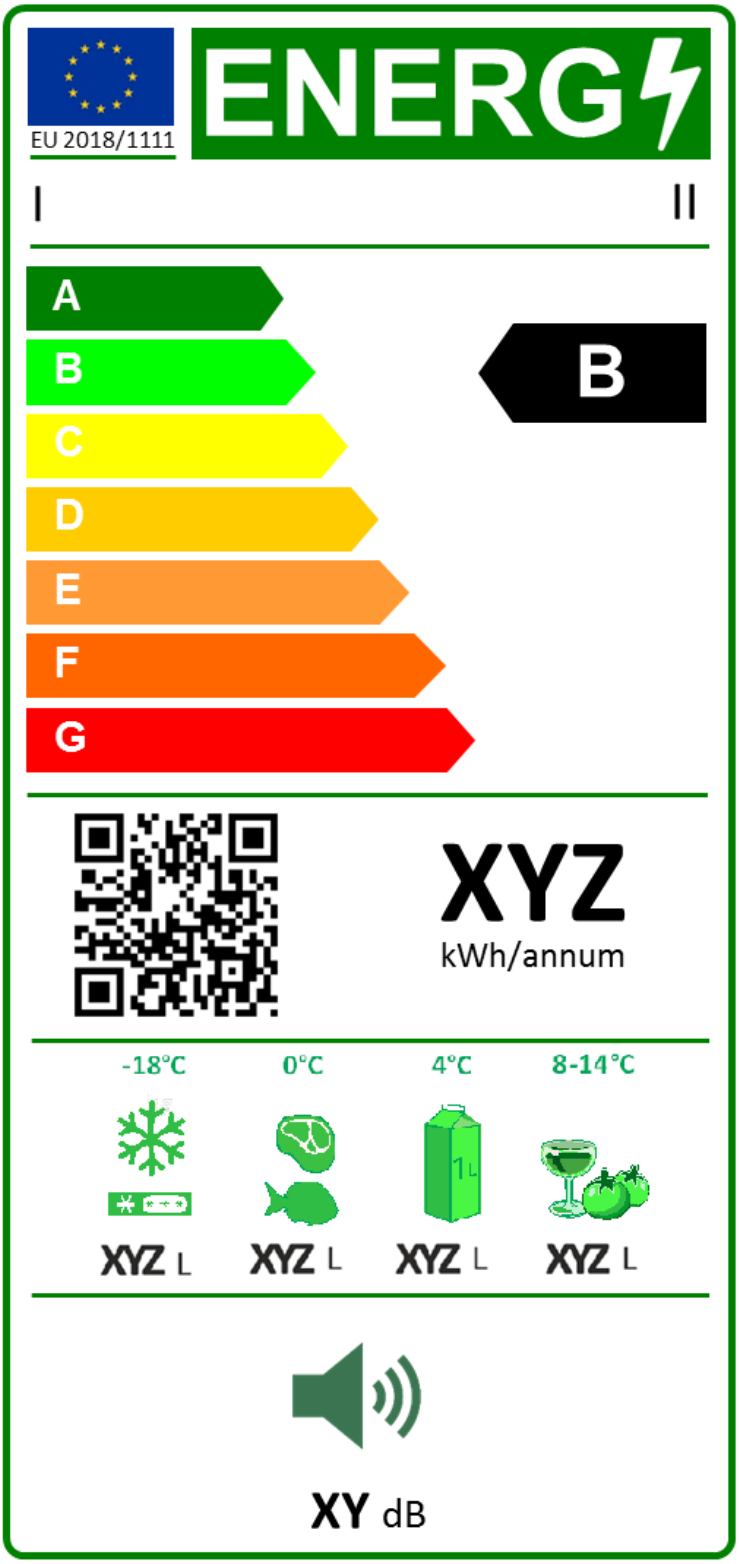
VIII. if applicable, sum of the volumes of all fresh food compartments as indicated in Table 3 of Annex IV, rounded to the nearest integer;

IX. if applicable, sum of the volumes of all unfrozen compartments except fresh food, i.e. cellar, wine storage, pantry types as indicated in Table 3 of Annex IV, rounded to the nearest integer;

X. airborne acoustic noise emissions expressed in dB(A) re1 pW, rounded to the nearest integer.

(1) The design of the label shall be in accordance with point 2(1) of this Annex. By way of derogation, where a model has been awarded an 'EU Ecolabel' under Regulation (EC) No 66/2010 of the European Parliament and of the Council (1), a copy of the EU Ecolabel may be added.

1.2. For wine storage appliances and low noise refrigerating appliances:



The following information shall be included in the label:

I. supplier's name or trade mark;

II. supplier's model identifier;

III. the energy efficiency class determined in accordance with Annex II; the head of the arrow containing the energy efficiency class of the household refrigerating appliance shall be placed at the same height as the head of the arrow of the relevant energy efficiency class;

IV. QR-code linking to model information on the supplier’s website and/or the EU product database;

V. annual energy consumption in kWh per year, AE rounded up to the nearest integer and calculated in accordance with Annex IV. For dedicated freezer appliances the value of AE shall be divided by 0,9 to demonstrate the additional effect of significant quantities of warm load that are typical for these appliances;

VI. if applicable, sum of the volumes of all frozen compartments as indicated in Table 3 of Annex IV, rounded to the nearest integer;

VII. if applicable, sum of the volumes of all chill compartments as indicated in Table 3 of Annex IV, rounded to the nearest integer;

VIII. if applicable, sum of the volumes of all fresh food compartments as indicated in Table 3 of Annex IV, rounded to the nearest integer;

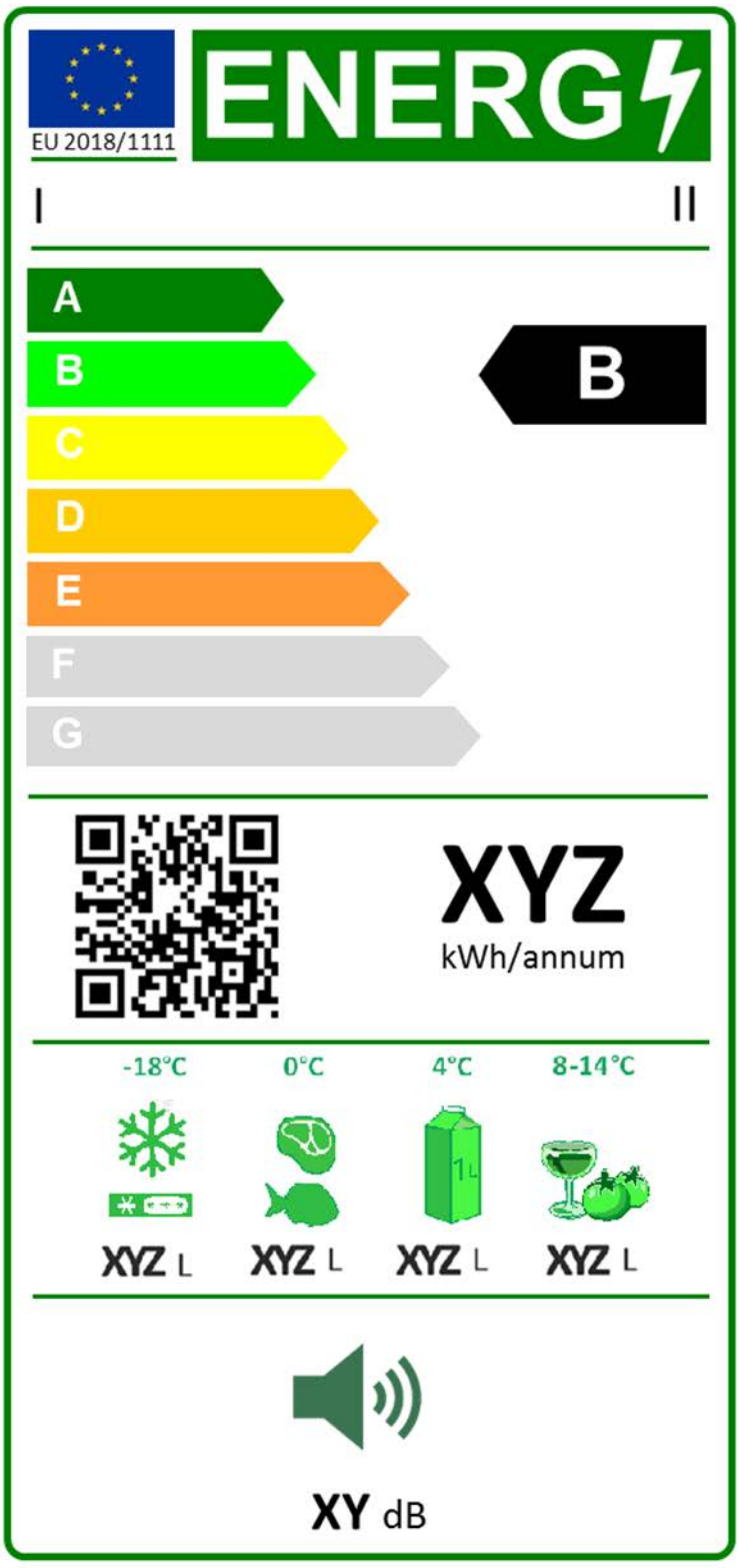
IX. if applicable, sum of the volumes of all unfrozen compartments except fresh food, i.e. cellar, wine storage, pantry types as indicated in Table 3 of Annex IV, rounded to the nearest integer;

X. airborne acoustic noise emissions expressed in dB(A) re1 pW, rounded to the nearest integer.

(2) The design of the label shall be in accordance with point 2(1) of this Annex. By way of derogation, where a model has been awarded an 'EU Ecolabel' under Regulation (EC) No 66/2010 of the European Parliament and of the Council (1), a copy of the EU Ecolabel may be added.

2. Label 2

For household refrigerating appliances, except for wine storage appliances:



The following information shall be included in the label:

I. supplier's name or trade mark;

II. supplier's model identifier;

III. the energy efficiency class determined in accordance with Annex II; the head of the arrow containing the energy efficiency class of the household refrigerating appliance shall be placed at the same height as the head of the arrow of the relevant energy efficiency class;

IV. QR-code linking to model information on the supplier’s website and/or the EU product database;

V. annual energy consumption in kWh per year, AE rounded up to the nearest integer and calculated in accordance with Annex IV. For dedicated freezer appliances the value of AE shall be divided by 0,9 to demonstrate the additional effect of significant quantities of warm load that are typical for these appliances;

VI. if applicable, sum of the volumes of all frozen compartments as indicated in Table 3 of Annex IV, rounded to the nearest integer;

VII. if applicable, sum of the volumes of all chill compartments as indicated in Table 3 of Annex IV, rounded to the nearest integer;

VIII. if applicable, sum of the volumes of all fresh food compartments as indicated in Table 3 of Annex IV, rounded to the nearest integer;

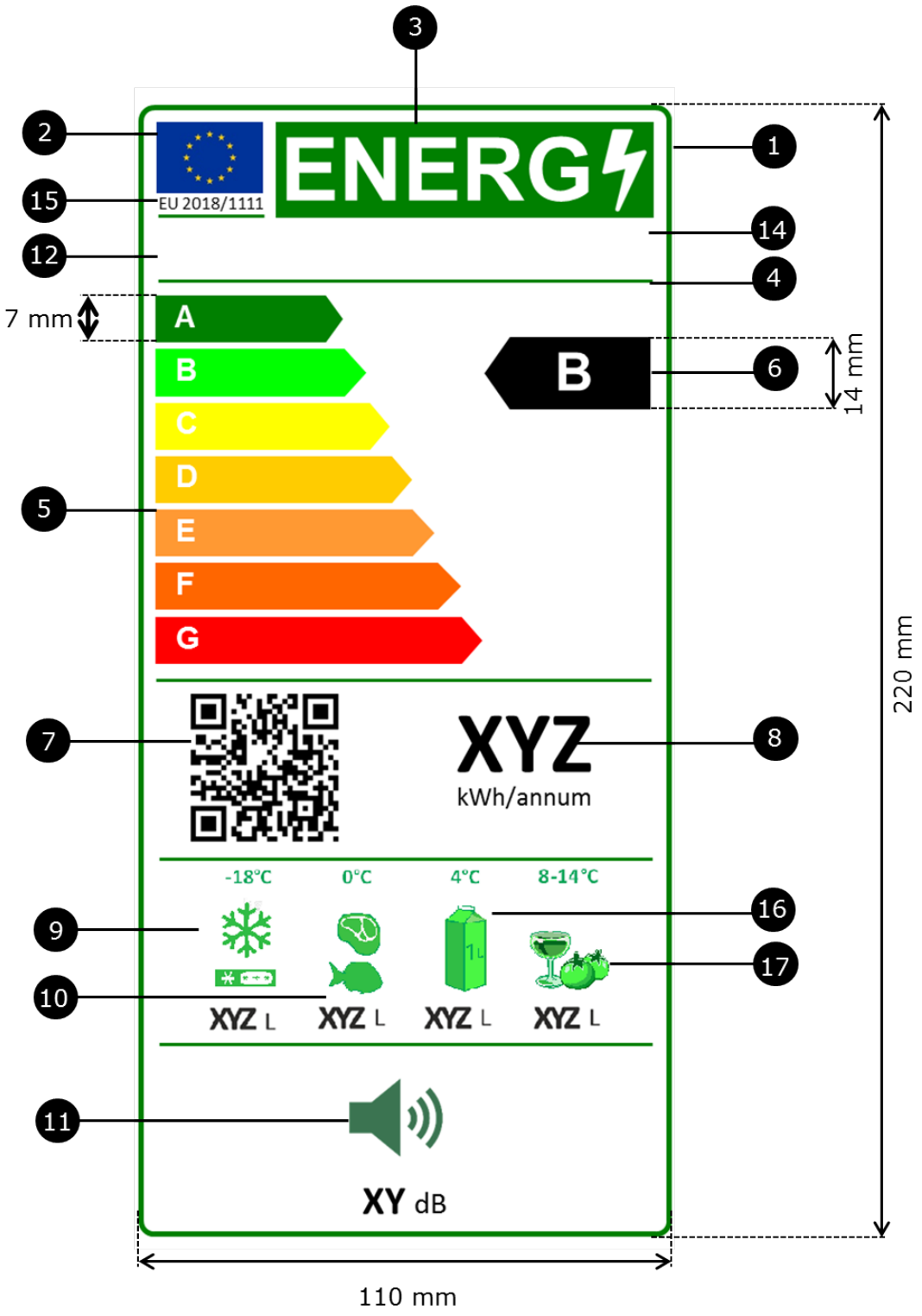
IX. if applicable, sum of the volumes of all unfrozen compartments except fresh food, i.e. cellar, wine storage, pantry types as indicated in Table 3 of Annex IV, rounded to the nearest integer;

X. airborne acoustic noise emissions expressed in dB(A) re1 pW, rounded to the nearest integer.

(3) The design of the label shall be in accordance with point 2(1) of this Annex. By way of derogation, where a model has been awarded an 'EU Ecolabel' under Regulation (EC) No 66/2010 of the European Parliament and of the Council (1), a copy of the EU Ecolabel may be added.

3. Label design

(1) For household refrigerating appliances and low noise refrigerating appliances the design of the label shall be as the following:



Whereby:

(a) The label shall be at least 110 mm wide and 220 mm high. Where the label is printed in a larger format, its content shall nevertheless remain proportionate to the specifications above.

(b) The background of the label shall be white.

(c) Colours shall be CMYK - cyan, magenta, yellow and black, following this example: 00-70-X-00: 0 % cyan, 70 % magenta, 100 % yellow, 0 % black.

(d) The label shall fulfil all of the following requirements (numbers refer to the figure above):

❶ **EU label border stroke:** 5 pt - colour: Green 100 % - round corners: 3,5 mm.

❷ **EU logo - colours: X-80-00-00 and 00-00-X-00.**

❸ **Energy label: colour: X-00-00-00.**

Pictogram as depicted: EU logo + energy label: width: 92 mm, height: 17 mm.

❹ **Sub-logos border:** 1 pt - colour: Cyan 100 % - length: 92,5 mm.

❺ **A-G scale**

– **Arrow:** height: 7 mm, gap: 0,75 mm -colours:

Highest class: X-00-X-00,

Second class: 70-00-X-00,

Third class: 30-00-X-00,

Fourth class: 00-00-X-00,

Fifth class: 00-30-X-00,

Sixth class: 00-70-X-00 or grey where applicable,

Last class: 00-X-X-00 or grey where applicable.

– **Text:** Calibri bold 19 pt, capitals and white; '+' symbols: Calibri bold 13 pt, capitals, white, aligned on a single row.

❻ **Energy efficiency class**

– **Arrow:** width: 26 mm, height: 14 mm, 100 % black;

– **Text:** Calibri bold 29 pt, capitals and white; '+' symbols: Calibri bold 18 pt, capitals, white and aligned on a single row.

❼ **QR-code:** in frame of 20 x 20 mm, either above or below black arrow depending on space available after rating.

❽ **Annual energy consumption:**

– **Border:** 3 pt - colour: Cyan 100 % - round corners: 3,5 mm.

– **Value:** Calibri bold 45 pt, 100 % black.

– **Second line:** Calibri regular 17 pt, 100 % black.

❾ **If applicable, sum of the volumes of all frozen compartments:**

– **Border:** 3 pt - colour: Green 100 % - round corners: 3,5 mm.

– **Value:** Calibri bold 25 pt, 100 % black. Calibri regular 17 pt, 100 % black.

If not applicable, blank space

❿ **Airborne acoustic noise emissions:**

– **Border:** 3 pt - colour: Green 100 % - round corners: 3,5 mm.

– **Value:** Calibri bold 25 pt, 100 % black.
Calibri regular 17 pt, 100 % black.

⓫ **If applicable, sum of the volumes of all chill compartments:**

– **Border:** 3 pt - colour: Green 100 % - round corners: 3,5 mm.

– **Value:** Calibri bold 25 pt, 100 % black.
Calibri regular 17 pt, 100 % black.

If not applicable, blank space

⓬ **Supplier's name or trademark**

⓭ **Supplier's model identifier**

⓮ The supplier's name or trademark and model identifier should fit in a space of 90 x 15 mm.

⓯ **Numbering of the Regulation: Text:** Calibri bold 11 pt.

⓰ **If applicable, sum of the volumes of all fresh food compartments:**

– **Border:** 3 pt - colour: Green 100 % - round corners: 3,5 mm.

– **Value:** Calibri bold 25 pt, 100 % black. Calibri regular 17 pt, 100 % black.

If not applicable, blank space

⓱ **If applicable, sum of the volumes of all unfrozen compartments except fresh food, i.e. cellar, wine storage, pantry types:**

– **Border:** 3 pt - colour: Green 100 % - round corners: 3,5 mm.

– **Value:** Calibri bold 25 pt, 100 % black. Calibri regular 17 pt, 100 % black.

If not applicable, blank space

ANNEX IV

Measurements and calculations

A. Measurements

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 takes into account the generally recognised state-of-the-art methods. They shall fulfil the conditions and technical parameters set out in points 1 to 6 and in B. points 1 to 2.

4. 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;

(b) for refrigerating appliances with automatically controlled electric anti-condensation heaters, the automatically controlled electric anti-condensation heaters will be switched off or otherwise disabled, where possible, during the measurement of electricity consumption. The electricity consumption of these heaters will be calculated from their power consumption declared by the manufacturer for 10 humidity conditions and 3 ambient temperature conditions.

(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 as the compartment type which has the highest energy consumption;

(e) for refrigerating appliances that can be digitally connected, this functionality shall not be disabled but there will be no active sending or receiving of data.

5. Assessment of volume:

(2) General:

The volume shall take into account the exact shapes of the walls including all depressions or projections.

When the volume is determined, internal fittings such as shelves, removable partitions, containers and interior light housings shall be considered as not being in place.

The volume of control housings, evaporator space, air ducts required for proper cooling and operation of the unit, the volume of any fixed or removable partition between compartments and sub-compartments, the space occupied by shelves moulded into the inner door panel shall be considered as being in place and their volumes deducted.

For through the door ice and water dispensers, the ice chute shall be included in the volume up to the dispensing function. The through the door ice and water dispensers and the insulating hump are not included in the volume. No part of the dispenser unit shall be included as volume.

(3) Volume of evaporator space:

The volume of the evaporator space shall be the product of the depth, width and height. The total volume to be deducted shall comprise the following:

(a) in the case of a forced air evaporator, the total volume of the evaporator cover and behind the evaporator cover shall be deducted, including the volume occupied by the evaporator fan and the fan scroll;

(b) in the case of plate style (e.g. roll-bond) evaporators, the volume behind vertically installed plate-style evaporators and the volume above horizontally installed plate -style evaporators if the distance between the horizontal plate -style evaporator and the nearest liner surface above is less than 50 mm. Removable drip trays/troughs shall be considered as not being present;

(c) in the case of refrigerant filled shelving, the volume above the uppermost shelf and below the lowermost shelf, if the distance between the shelf and the nearest horizontal plane of the cabinet inner wall is less than or equal to 50 mm. All refrigerated shelves are considered as not present;

(d) in case there is a fan installed in an unfrozen compartment with a refrigerated wall evaporator or a plate style evaporator, the volume of the fan.

(4) Two-star sections and/or compartments:

Two-star sections and/or compartments are permitted both in the door and in the remaining volume of a refrigerating appliance when all the following conditions are met:

(a) the two-star section or compartment is marked with the appropriate identification symbol;

(b) the two-star section and/or compartment is separated from the three-star of four-star volume by a partition, container, or similar construction;

(c) the rated total two-star section volume does not exceed 20 % of the total volume of the compartment;

(d) the instructions give clear guidance regarding the two-star section and/or compartment;

(e) the volume of the two-star section and/or compartment is stated separately and is not included in the three-star or four-star volume.

6. Storage conditions and target temperatures per compartment type:

The following Table gives the storage conditions and target temperature per compartment type:

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*	*nr.*	*°C*	*°C*	*°C*
Un-frozen	Pantry	*[2]*	+14	+20	+17
	Wine storage	*[2][3]*	+5	+20	+12
	Cellar	*[2]*	+2	+14	+12

	Fresh food	*[2]*	0	+8	+4
Chill	Chill	*[4]*	−3	+3	+2
Frozen	0-star & ice-making	*[5]*	*n.a.*	0	0
	1-star	*[5]*	*n.a.*	−6	−6
	2-star	*[5][6]*	*n.a.*	−12	−12
	Freezer (3 and 4-star)	*[5][6]*	*n.a.*	−18	−18

Notes:

[1] T_c relates to the target temperature for testing energy consumption and is the average over time and over a set of sensors.

[2] T_{min} and T_{max} relate to average values measured over the test period (average over time and over a set of sensors) .

[3] The average temperature variation over the test period for each sensor shall be no more than ±0,5 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.

[4] T_{min} and T_{max} relate to instantaneous values during the test period.

[5] T_{max} relates to average values measured over the test period (average over time and over a set of sensors).

[6] During a defrost and recovery period, the maximum temperature of all sensors is not permitted to rise more than 3.0 K.

n.a.=not applicable

7. Energy consumption tests household refrigerating appliances:

(1) Introduction

The energy consumption of an appliance is determined from measurements taken when tested with appropriate test conditions in an ambient temperature of 32 °C and an ambient temperature of 16 °C. The value of the energy consumption shall be for a temperature control setting (or equivalent point) where all average compartment air temperatures are at or below the target temperatures specified in Table 1 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) total average steady state power consumption P_{ss}, measured at 16 °C ambient temperature and measured at 32 °C ambient temperature;

(b) incremental defrost and recovery energy $\Delta E_{d\text{-}f}$ (in Wh) for products with one or more auto-defrost systems (each with its own defrost control cycle), the defrost and recovery energy for a representative number of defrost and recovery periods for each system shall be determined;

(c) defrost interval $t_{d\text{-}f}$ (in h) for products with one or more defrost systems (each with its own defrost control cycle), the defrost interval $t_{d\text{-}f}$ (in h) shall be determined for each system under a range of conditions.

Throughout all tests the reference average ambient temperatures of 16 and 32 °C have to be maintained with a bandwidth of ± 0,5 K. On top of that, for steady state power consumption the test results will be corrected for smaller deviations from the

reference. Note that for all compartments, the air temperatures of the compartment(s) will be measured and not the temperature inside ballasts. The appliance doors will remain closed and no warm load is introduced in the storage volume(s).

Each of these parameters will be determined through separate (sets of) tests. To improve the efficiency and accuracy of testing, the test period is not fixed, but is determined by whether a 'steady state' is reached.

Steady state is defined as a condition that occurs when test results comply with a series of acceptance criteria, laid down in an accurate, reliable and reproducible test method, to ascertain that stable test conditions occur. These acceptance criteria include that spread and slope of the average compartment air temperature and average power consumption between a minimum number of non-overlapping sampling periods or 'blocks' are within a specific narrow bandwidth. Furthermore there are rules as regards:

(a) the minimum number of blocks;

(b) position of the blocks (adjacent or not, distance to defrost and recovery period, depending on the purpose of the test);

(c) minimum number of temperature control cycles ('TCCs') or minimum length in time per block ('fixed time slices' in case no repetitive patterns can be established);

(d) repeatability (e.g. that a valid set of blocks of test data is preceded by a minimum number of also compliant set of blocks);

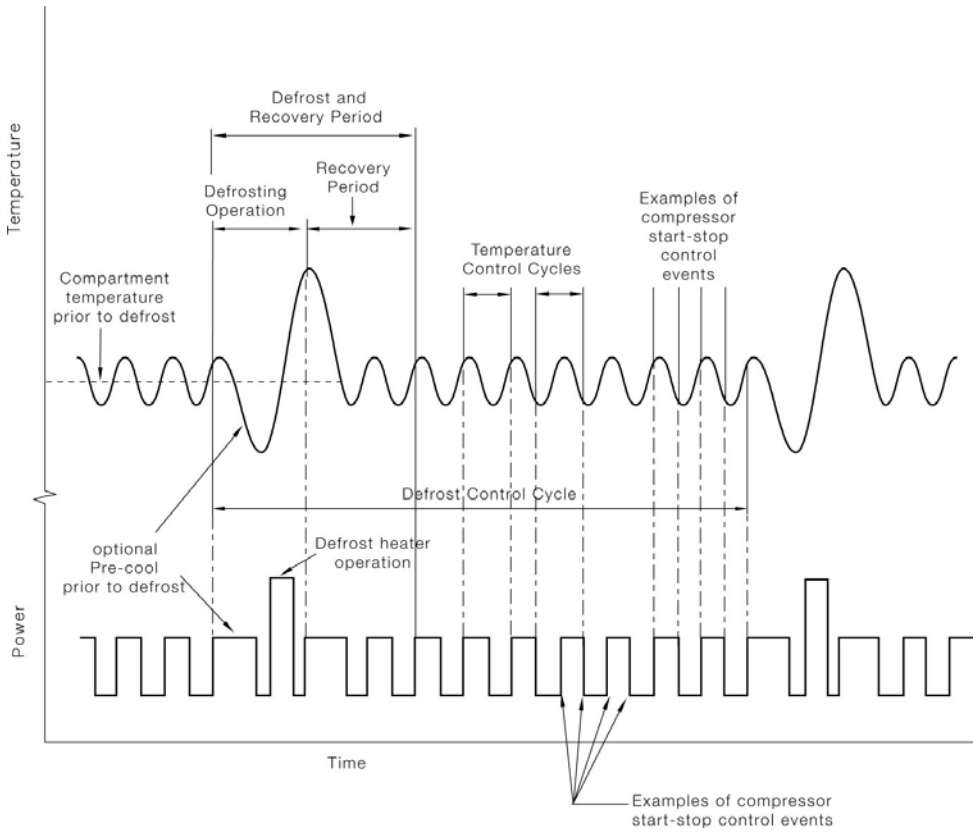
(e) the type of compartments to measure in a combi-appliance;

(f) how to extend the test data if the first test runs do not comply with the acceptance criteria.

Figure 1 gives an illustration of a typical compartment air temperature and electricity input for a refrigeration appliance:

Figure 1

Illustration of a typical compartment air temperature and electricity input for a refrigeration appliance



(2) Steady state power consumption

(1) Manual Defrost

For manual defrost products using a TCC-based test procedure, the acceptance criteria and rules for steady state energy consumption include:

(a) a minimum number of 3 adjacent blocks of an equal number of TCCs (at least 1 TCC per block);

(b) a minimum test period (6h);

(c) a maximum spread across blocks for temperature (0,25K) and power consumption (varies between 1% for a 12h test period and 3% for a test period of 36 hours or more, with linear interpolation in between);

(d) a maximum slope between the first and last block for temperature (0,025 K/h) and power consumption (less than 0,25%/h).

A valid steady state test period can start only after already two successive test-periods, each containing three blocks, meet the above criteria. In case of multi-compartment appliances, the temperatures relate to those in the largest frozen and the largest unfrozen compartment or –in case all compartments are either all frozen or all unfrozen—the largest two compartments.

In case of using 'fixed time slices' for testing of manual defrost products, the minimum test period is 12h, the maximum power spread is always 1% independent of the test period. The other acceptance criteria are the same as for appliances tested using TCCs.

(2) Auto defrost

For auto-defrost appliances also the manual defrost method can be used to establish the steady state energy consumption. Only in case it is difficult to find a valid steady state energy consumption in between defrost and recovery periods two separate blocks may be used, each ending at the start of a defrost and recovery period. Each block shall contain at least 4 TCCs and one block should not be 25% longer or shorter than the other. In case of fixed time slices the blocks shall be no less than 4 h in length and blocks must have equal lengths. If the time between defrost and recovery periods exceeds 48 hours, the start of the second block may be selected after this 48 h period. The maximum allowed average temperature spread between the blocks is 0,5 K. The maximum allowed spreads in power consumption shall be less than 2 % (relative spread) or less than 1 W (absolute spread), whichever is the greater value.

(3) Incremental defrost and recovery energy consumption

For auto-defrost appliances the incremental defrost and recovery energy $\Delta E_{d\text{-}f}$ is established by finding two valid steady state blocks, following steady state acceptance criteria similar to those mentioned in Section 4.(2), one before and one after the defrost and recovery period. The reference point for defrost and recovery period is 2 h after the (first) activation of the defrost heater. The end of the first block is 3 h before and the start of the second block is 3 h after this reference point. Each block contains at least 3 TCCs or has a fixed length of 3 h. The start of the first block shall be no less than 5 h after the initiation of the previous 'defrost heater on' or, in the case where there is no defrost heater, no less than 5 h after the interruption of the refrigeration system related to the automatic defrost. The second block shall not overlap with the subsequent defrost and recovery period.

Note that if these initial start, stop and interval values do not deliver an acceptable result they can be shifted.

The relevant test period runs from the start of the first block until the end of the second block, i.e. with the defrost and recovery period in between. The total energy consumption during this test period is measured. Subsequently, the total energy consumption for that period is calculated as if it were the steady state energy consumption, based on the steady state power measured in the two steady-state blocks. The difference between the two is the incremental defrost and recovery energy consumption.

The test(s) shall be done at least for each temperature control setting. The defrost and recovery period selected for each temperature control setting shall be adjacent to the steady state period used for energy determination. In case there is more extensive test data, the average of at least 4 defrost and recovery incremental energy consumption data, for each control setting, shall be used. In this case at least 50 % of all values of ΔE_{df} shall have the coldest compartment at or below target temperature. A separate value for ΔE_{df} shall be determined for each ambient temperature.

(4) Defrost and recovery frequency and interval

There are three methods of defrost interval control, meaning the control parameter that determines the interval between defrost cycles, distinguishing between ‘timer’, ‘compressor run-time’ or ‘variable defrost’, whereby the latter may be based on operational parameters (door-openings, inserting warm load) or direct measurement of frost accumulation.

For the timer-control, which is relatively rare, the interval can be measured directly. Values for at least three defrost intervals shall be determined, with at least one value at an ambient temperature of 16 °C and one value at an ambient temperature of 32 °C.

For the compressor run-time control, the past run-time of the compressor is used as a proxy for the door-openings and inserted warm load.

For the compressor run-time control, the interval can be measured directly. Tests shall be undertaken over a whole defrost control cycle, at least one at each ambient temperature, in order to verify that it is a run time controller and estimate the value of the interval. Complementary test at e.g. other ambient temperatures and/or temperature control settings are required to check consistency of the interval with the compressor run time. The coefficient of variation (standard deviation divided by the mean) of the estimated values for compressor run time shall be less than 10 % for the defrost intervals examined; otherwise the controller shall be qualified as a 'variable defrost' controller.

For a variable defrost controller the interval is calculated on the basis of values specified by the manufacturer for Δt_{d-max} maximum possible defrost interval at an ambient temperature of 32 °C and Δt_{d-min} minimum possible defrost interval at an ambient temperature of 32 °C, both expressed in hours.

The value for Δtdf16 at an ambient temperature of 16 °C shall be double the value of the defrost interval Δtdf32 for an ambient temperature of 32 °C.

Δt_{d-min} shall not exceed 12 h at an ambient temperature of 32 °C (elapsed time). Δt_{d-max} shall not exceed 96 h at an ambient temperature of 32 °C.

Δt_{d-min} shall be based on the shortest conceivable defrost interval under heavy usage conditions (i.e. heavy use, frequent door openings and high humidity) at an ambient temperature of 32 °C. Tests under heavy usage conditions to verify the claimed value may be undertaken. The value for Δt_{d-max} shall be achievable under test conditions with compartment temperatures at or below target temperatures in steady state. Manufacturers shall specify any special condition required to achieve the claimed value.

In case the manufacturer does not supply declared values for Δt_{d-min} and Δt_{d-max}, default values of 6 h for Δt_{d-min} and 96 h for Δt_{d-max} shall be used, resulting in a Δt_{df32} of 24 h and a Δtdf16 of 48 h.

If, apart from the manufacturer not declaring the values, the verification test shows the operation not consistent with a variable defrost controller then the averages of 3 defrost intervals at both 16 and 32°C ambient is measured and used as values for Δt_{df16} and Δt_{df32} respectively, whereby Δt_{df16} shall not exceed 20 h and Δt_{df32} shall not exceed 10 h.

8. Energy consumption tests low-noise refrigerating appliances:

Energy consumption of low-noise appliances shall be tested only at an ambient temperature of 25 °C. Low-noise appliances have no auto-defrost and thus the tests only determine the steady state power consumption P_{ss25}. Otherwise, the test procedure is identical to that of dedicated cellar or pantry household appliances.

9. Performance of chill compartments:

In order to avoid loopholes in the declaration of chill compartments, as defined in Table 3, the following additional requirements apply:

(a) for a variable temperature compartment rated as fresh food and/or chill, the energy efficiency index shall be determined for each temperature condition and the highest value shall be applied;

(b) a chill compartment shall be able to control its average temperature during energy testing within a certain range without user-adjustments of its control; this shall be verified as follows:

  (a) determine the reference chill compartment temperature $T_{ccma,ref}$ by performing an energy consumption test at 32°C ambient. $T_{ccma,ref}$ is the interpolated value of T ccma 1 (e.g. found at the interpolated fresh food compartment Tma =4°C),

  (b) perform an energy consumption test at 16°C. T_{ccma} shall be within $T_{ccma,ref\pm1,5K}$ for any setting used for interpolation, with the limitation that the fresh food compartment T_{ma} shall be in the range from 2 to 6°C.

B. Calculations

1. For household refrigerating appliances

(1) Energy Efficiency Index EEI:

The Energy Efficiency Index EEI 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;

the outcome is a dimensionless number, usually expressed as a percentage (%).

(2) Annual Energy consumption *AE*:

The Annual Energy consumption *AE* of a household refrigerating appliance is based on the measurements according Section A at two ambient test temperatures, 16 and 32°C, regarding:

  (a) steady state power consumption P_{ss} (per ambient temperature P_{ss16}, P_{ss32}) in W;

  (b) the incremental defrost energy consumption $\Delta E_{d\text{-}f}$ (per ambient temperature $\Delta E_{d\text{-}f16}$ and $\Delta E_{d\text{-}f32}$) in Wh;

  (c) defrost and recovery interval td-f in h (per ambient temperature $t_{d\text{-}f16}$ and $t_{d\text{-}f32}$).

The average daily energy consumption E_{daily} in kWh/24h is calculated from values at both ambient test temperatures E_{16C} and E_{32C} as follows:

$E_{daily} = (E_{16C} + E_{32C})$;

with $E_{16C} = 0.001 \cdot 24 \cdot (P_{ss16} + \Delta E_{d\text{-}f16} / t_{d\text{-}f16})$ and;

$E_{32C} = 0.001 \cdot 24 \cdot (P_{ss32} + \Delta E_{d\text{-}f32} / t_{d\text{-}f32})$.

[1] T_{ccma} = The time averaged chill compartment temperature is the integrated time average of the instantaneous average chill compartment temperature (T_{cca}) or the arithmetic average of the integrated time averaged chill compatment temperatures (T_{ccim}) (both methods give the same result). The suffix 'cc' indicates that T_{ma}, T_{im} and T_a relate to a chill compartment type.

The values for E_{16C} and E_{32C} may result from two or three point interpolations of outcomes from several test-runs.

The Annual Energy consumption AE in kWh/a is as follows:

$AE = 365 \cdot (E_{16C} + E_{32C}) \cdot 0{,}5$.

(3) Standard Annual Energy consumption *SA*E:

The Standard Annual Energy consumption *SAE* of a household refrigerating appliance is based on the type(s) and volume(s) of the compartments V_c (in dm³ or litres, with one decimal), its total volume *V* (in dm³ or litres, rounded to the nearest integer) and a series of parameters given in Table 4.

The Standard Annual Energy consumption *SAE*, in kWh/a, is calculated as follows:

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

where c is the compartment index suffix and n is the total number of compartment types.

Note that for the variable temperature compartments the compartment type with the lowest target temperature is chosen for which it is declared suitable.

Table 4

Default values of parameters per compartment type in the calculation of EEI

Compartment type	r_c	N_c	M_c	A_c	B_c	*C*	*D*	L_c
Name	-	-	-	-	-	-	-	-
Pantry	0.35	75	0,12	1,00	1,04	between 1,15 and 1,56 for refrigerator-freezers[a], 1,15 for other combis, 1,00 for dedicated appliances	1.02, 1.035, 1.05 for 3,4 or more than 4 doors	1,00
Wine storage	0.6							
Cellar	0.6							
Fresh food	1.00							
Chill	1.1	138	0,12		1,06			
0-star & ice-making	1.2	138	0,15	1,10	1,10			
1-star	1.5							
2-star	1.8							
Freezer (3 and 4-star)	2.1							0,9 if dedicated

[a] *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 $C = 1{,}89 - 1{,}1 \cdot frzf$;

– else $C = 1{,}15$.

2. Calculation methods for low-noise refrigerating appliances

The Energy Efficiency Index *EEI* (expressed in %) is calculated as above, i.e.:

$EEI = AE/AEC$.

Basis for the assessment of the energy consumption of low noise refrigerating appliances is the steady state power consumption at a single ambient temperature of 25 °C P_{ss25} (in W), measured in accordance with Section A.5.

The daily energy consumption $E_{daily25}$ at 25°C ambient temperature (in kWh/24h) is given by:

$E_{daily25} = 0{,}001 \cdot 24 \cdot P_{ss25}$.

The annual energy consumption *AE* (in kWh/a) is given by:

$AE = 365 \cdot E_{daily2}$.

Low noise appliances are manual defrost (A_c=1), stand-alone (B_c=1), dedicated (C=1), single door (D=1) appliances with cellar (r_c=0,6) or pantry (r_c=0,35) compartment type as defined in Tables 3 and Table 4. The latter implies N_c=75 and M_c=0,12 and L=1. The Standard Annual Energy consumption *SAE* (in kWh/a) can thus be simplified as follows:

– for cellar types: $SAE = 75 + V \cdot 0{,}6 \cdot 0{,}12 = 75 + 0{,}072V$;

– for pantry types: $SAE = 75 + V \cdot 0{,}35 \cdot 0{,}12 = 75 + 0{,}042V$.

ANNEX V

Product information sheet

1. The information in the product information sheet of household refrigerating appliances and low noise refrigerating appliances shall in the product brochure or other literature provided with the product:

(a) supplier's name or trade mark;

(b) supplier's model identifier;

(c) energy efficiency class of the model in accordance with Annex II;

(d) where the model has been awarded an 'EU Ecolabel award' under Regulation (EC) No 66/2010, this information may be included;

(e) annual energy consumption in kWh per year, is parameter *AE* rounded up to the nearest integer and calculated in accordance Annex IV, whereby for dedicated freezers the calculated *AE* value is divided by 0,9 to find the annual energy consumption and described as 'Energy consumption "XYZ" kWh per year, based on standard test results in steady state conditions;

(f) volume, type and, if applicable, star rating of each compartment in accordance with Annex IV, if any, Variable temperature compartment will be identified separately with the compartment type characteristics for which it is declared to be suitable;

(g) the mention ‘auto-defrost' for the relevant compartment(s);

(h) 'power cut safe "X" h' defined as 'temperature rise time';

(i) 'freezing capacity' in kg/24 h;

(j) 'climate class' in accordance with the definition in Annex I, and expressed as: 'Climate class: W [*climate class acronym*]. This appliance is intended to be used at an ambient temperature between "X" [*lowest ambient temperature*] °C and "Y" [*highest ambient temperature*] °C';

(k) ‘low noise appliance’ or ‘dedicated wine storage appliance’ , if applicable;

(l) 'airborne acoustic noise' emissions expressed in dB(A) re1 pW, rounded to the nearest integer;

(m) if the model is intended to be a built-in appliance, an indication to this effect;

(n) for wine storage appliances, the following information: 'This appliance is intended to be used exclusively for the storage of wine'. This point shall not apply to household refrigerating appliances that are not specifically designed for wine storage but may nevertheless be used for this purpose, nor to household refrigerating appliances that have a wine storage compartment combined with any other compartment type.

2. One product information sheet may cover a number of refrigerating appliances models supplied by the same supplier.

3. The information contained in the product information sheet may be given in the form of a copy of the label, either in colour or in black and white. Where this is the case, the information listed in point 1 not already displayed on the label shall also be provided.

ANNEX VI

Technical documentation

The technical information referred to in Article 3(c) shall include the technical parameters for measurements, established in accordance with Annexes IV:

(a) the name and address of the supplier;

(b) a general description of the household refrigerating or low noise refrigerating model, sufficient for it to be unequivocally and easily identified;

(c) where appropriate, the references of the harmonised standards applied;

(d) where appropriate, the other technical standards and specifications used;

(e) identification and signature of the person empowered to bind the supplier;

(f) technical parameters for measurements as follows:

i. overall dimensions, expressed to the nearest millimetre, means space taken up by the refrigerating appliance (height, width and depth) with doors or lids closed;

ii. total volume of the appliance, in dm^3 or litres rounded to the nearest integer, matching the sum of the compartment volumes in point c) hereafter;

iii. volume, in dm^3 or litres rounded to one decimal place, per compartment, identified by the name and meeting the performance requirements of the compartment type as indicated in Table 1. Variable temperature compartment will be identified separately with the compartment type characteristics for which it is declared to be suitable;

iv. target temperature, in °C rounded to the nearest integer, per compartment;

v. 'low noise appliance' or 'wine storage appliance' , if applicable;

vi. climate class: SN, N, ST or T;

vii. minimum and maximum ambient temperature, in °C rounded to the nearest integer, for which the appliance is suitable;

viii. daily energy consumption, E_{daily} in kWh/24h rounded to three decimal places;

ix. annual energy consumption, *AE* in kWh rounded to the nearest integer;

x. standard annual energy consumption, *SAE* in kWh rounded to the nearest integer;

xi. total average steady state power consumption, P_{ss} in W rounded to the nearest integer;

xii. energy efficiency index EEI, number expressed in % rounded to the nearest integer;

xiii. defrosting type, means the method to remove frost accumulation on the evaporator(s) of an appliance, distinguishing 'auto-defrost' or 'manual defrost';

xiv. defrost interval control, meaning the control parameter that determines the interval between defrost cycles, distinguishing between 'timer', 'compressor run-time' or 'variable defrost', whereby the latter may be based on operational parameters (door-openings, inserting warm load) or direct measurement of frost accumulation;

xv. incremental defrost and recovery energy consumption, $\Delta E_{d\text{-}f}$ in Wh rounded to the nearest integer;

xvi. defrost interval, $t_{d\text{-}f}$ in h, rounded to two decimal places;

xvii. temperature rise time, in h rounded to hours and whole minutes;

xviii. specific freezing capacity, x in kg/12h, rounded to two decimal places;

xix. winter switch present, yes/no;

xx. star rating in case of a freezer compartment with this feature as defined in Annex I;

xxi. fast freeze in case of a freezer compartment with this feature as defined in Annex I;

xxii. anti-condensation heater type 'manual on-off', 'ambient controlled', 'other' or 'none';

xxiii. airborne acoustical noise emissions expressed in dB(A) re1 pW, rounded to the nearest integer;

xxiv. Individual measurement results for P_{ss} , $\Delta E_{d\text{-}f}$ $t_{d\text{-}f}$ from valid test runs at 16 °C and 32 °C ambient temperature for household appliances and at 25 °C ambient temperature for low noise appliances;

xxv. If applicable, interpolation or triangulation calculations to arrive at the assessment of E_{daily} per relevant ambient temperature.

ANNEX VII

Information to be provided in the case of distance selling, except distance selling on the Internet

1. Any paper based distance selling must show the energy class and the range of available efficiency classes as following the example below, with the colour of the arrow matching the letter of the energy class:

It must be possible for the customer to access the full label and the product information sheet through a free access website, or to request a printed copy.

2. Telemarketing based distance selling must specifically inform the customer of the energy class of the product and the range of the energy classes available on the label, and that they can access the full label and the product information sheet through a free access website, or by requesting a printed copy.

Annex VIII

Information to be provided in the case of sale, hire or hire-purchase through the internet

1. The appropriate label made available by suppliers in accordance with Article 3.1(g) shall be shown on the display mechanism in proximity to the price of the product. The size shall be such that the label is clearly visible and legible and shall be proportionate to the size specified in point 2 of Annex III for household refrigerating appliances and low noise refrigerating appliances. The label may be displayed using a nested display, in which case the image used for accessing the label shall comply with the specifications laid down in point 3 of this Annex. If nested display is applied, the label shall appear on the first mouse click, mouse roll-over or tactile screen expansion on the image.

2. The image used for accessing the label in the case of nested display shall:

(a) be an arrow in the colour corresponding to the energy efficiency class of the product on the label;

(a) indicate on the arrow the energy efficiency class of the product in white in a font size equivalent to that of the price; and

(b) have one of the following two formats:

3. In the case of nested display, the sequence of display of the label shall be as follows:

(c) the image referred to in point 2 of this Annex shall be shown on the display mechanism in proximity to the price of the product;

(d) the image shall link to the label;

(e) the label shall be displayed after a mouse click, mouse roll-over or tactile screen expansion on the image;

(f) the label shall be displayed by pop up, new tab, new page or inset screen display;

(g) for magnification of the label on tactile screens, the device conventions for tactile magnification shall apply;

(h) the label shall cease to be displayed by means of a close option or other standard closing mechanism;

(i) the alternative text for the graphic, to be displayed on failure to display the label, shall be the energy efficiency class of the product in a font size equivalent to that of the price.

The appropriate product information sheet made available by suppliers in accordance with Article 3(g) shall be shown on the display mechanism in proximity to the price of the product. The size shall be such that the product information sheet is clearly visible and legible. The product information sheet may be displayed using a nested display, in which case the link used for accessing the fiche shall clearly and legibly indicate “Product information sheet”. If nested display is used, the product information sheet shall appear on the first mouse click, mouse roll-over or tactile screen expansion on the link.

ANNEX IX

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 supplier as an allowed tolerance to establish the values in the technical documentation. The values and classes on the label or in the product fiche shall not be more favourable for the supplier than the values reported in the technical documentation.

When verifying the compliance of a product model with the requirements laid down in this Delegated Regulation, for the requirements referred to in this Annex, 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 Article 3.3 of Regulation (EU) 2017/1369, and, where applicable, the values used to calculate these values, are not more favourable for the supplier than the corresponding values given in the test reports.

   (b) the declared values meet any requirements laid down in this Regulation, and any required product information published by the supplier 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 5;

3. if the results referred to in point 2(a) or (b) are not achieved, the model and all models that have been listed as equivalent household 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 5;

6. if the result referred to in point 5 is not achieved, the model and all models that have been listed as equivalent household 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

Annexes IV.

The Member State authorities shall only apply the verification tolerances that are set out in Table 5 and shall only use the procedure described in points 1 to 7 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 for parameters in Table 5.

Table 5

Verification tolerances for measured parameters

Parameters	Verification
Volume	The determined value shall not be less than the declared value by more than 3 % or 1 litre, whichever is the greater value. Where the volumes of the cellar compartment and the fresh food storage compartment are adjustable, relative to one another, by the user, the volume shall be tested when the cellar compartment is adjusted to its minimum volume.
Freezing capacity	The determined value shall not be less than the declared value by more than 10 %.
Energy consumption	The determined value shall not exceed the declared value of the annual energy consumption *AE* by more than 10 %.

ANNEX X

Displaying the energy class and the range of the efficiency classes in visual advertisements and in promotional material

1. For the purposes of ensuring conformity with the requirements laid down in Article 3(1)(e) and Article 4(1)(c), the energy class and the range of efficiency classes available on the label shall be shown on visual advertisements as follows, with the colour of the arrow matching the letter of the energy class:

2. For the purposes of ensuring conformity with the requirements laid down in Article 3(1)(f) and Article 4(1)(d) the energy class and the range of efficiency classes available on the label shall be shown in promotional material as follows, with the colour of the arrow matching the letter of the energy class: