

**Working document on a possible Commission Regulation implementing Directive
2005/32/EC with regard to household refrigerating appliances**

Chapter 1
Subject matter and scope

1. This Regulation establishes eco-design requirements for the placing on the market of electric mains operated household refrigerating appliances including when they are sold for non-household use or for the refrigeration of items other than foodstuffs.
It also establishes ecodesign requirements for primarily electric mains operated refrigerating appliances that can also run on batteries.
2. The requirements set out in this Regulation shall not apply to:
 - (a) refrigerating appliances which primarily run on other energy sources than electricity such as fuels (e.g. LPG, kerosene, bio-diesel);
 - (b) refrigerating appliances that are only battery-operated;
 - (c) refrigerating appliances that are only battery-operated, which can be connected to electric mains through an additional AC/DC converter, purchased separately, for primary use in non-household applications such as cars, caravans, motor caravans, trucks or vessels;
 - (d) custom-made refrigerating appliances, made on a one-off basis and not equivalent to other refrigerating appliance models;
 - (e) refrigerating appliances with a storage volume larger than 800 litres;
 - (f) refrigerating appliances primarily intended for medical applications for storing and freezing of vaccines and ice pack freezing with a factory fitted non-removable label on the lid or near the top of the door carrying the information about the specific use in Arabic, English, French, mandarin Chinese, Russian and Spanish;
 - (g) refrigerating appliances where the removal of refrigerated foodstuffs is electronically sensed and can be automatically transmitted through a network connection to a remote control system for accounting;
 - (h) appliances the primary function of which is not the storage of foodstuffs through refrigeration (such as stand-alone ice-makers or chilled water/drinks/beer dispensers).

Chapter 2
Definitions

In addition to the definitions set out in Directive 2005/32/EC, the following definitions shall apply:

- (1) "foodstuffs" mean food, ingredients, beverages or other items primarily intended for consumption that require refrigeration at specified temperature conditions;
- (2) "household appliance" means a factory-assembled machine designed by the supplier to be used principally for non-professional purposes in dwellings, including cellars, garages and other outbuildings, for housekeeping tasks such as cleaning, cooking, preparation, upkeep and storage of foodstuffs; including appliances sold as complete building kits to be assembled by the end-user without any specialised intervention in accordance with instructions provided with the kit;

- (3) “refrigerating appliance” means a factory-assembled insulated cabinet with one or more compartments and of suitable volume and equipment for household use, cooled by natural convection or a frost-free system whereby the cooling is obtained by one or more energy-consuming means;
- (4) “refrigerator” means a refrigerating appliance intended for the preservation of foodstuffs, one of whose compartments - or the only compartment in the case of a single compartment appliance - is suitable for the storage of fresh food and/or beverages, including wine;
- (5) “refrigerator-freezer” means a refrigerating appliance having at least one compartment suitable for the storage of fresh food and/or beverages including wine (the fresh-food storage compartment) and at least one other (the food freezer compartment) suitable for the freezing of fresh food and the storage of frozen foodstuffs under three-star storage conditions;
- (6) “frozen-food storage cabinet” means a refrigerating appliance having one or more compartments suitable for the storage of frozen foodstuffs;
- (7) “food freezer” means a refrigerating appliance having one or more compartments suitable for freezing foodstuffs with temperatures ranging from ambient temperature down to -18°C and which is also suitable for the storage of frozen foodstuffs under three-star storage conditions, although in certain instances, two-star sections and/or compartments are permitted within the compartment or cabinet;
- (8) “wine storage appliance” means a refrigerating appliance which has no compartment other than (one or more) wine storage compartment(s);
- (9) “multi-use appliance” means a refrigerating appliance which has no compartment other than (one or more) multi-use compartment(s);
- (10) “equivalent refrigerating appliance” means a model placed on the market with the same gross and storage volumes, same technical, efficiency and performance characteristics, and same compartment types of another refrigerating appliance model placed on the market under a different commercial code number by the same manufacturer.

Chapter 3

Ecodesign requirements

1. Refrigerating appliances shall meet the generic ecodesign requirements set out in Annex II, Part 1 and the specific ecodesign requirements set out in Annex II, Part 2.
2. Each ecodesign requirement shall apply in accordance with the following stages:
Stage 1: [one year after entry force of this Regulation]
Stage 2: [four years after entry force of this Regulation]
Stage 3: [six years after entry force of this Regulation]

Chapter 4

Benchmarks

The indicative benchmarks for best-performing products for compression-type refrigerating appliances and absorption-type refrigerating appliances available on the market at the time of adopting this Regulation are set out in Annex VI.

Chapter 5
Conformity assessment

1. The conformity assessment procedure referred to in Article 8(2) of Directive 2005/32/EC shall be the internal design control system set out in Annex IV of that Directive or the management system set out in Annex V of that Directive.
2. For the purposes of conformity assessment pursuant to Article 8 of Directive 2005/32/EC, the technical documentation file shall contain a copy of the product information provided in accordance with Annex IV, Part 3 and the results of the calculations required in Annex III of this Regulation.

Where the information included in the technical documentation file for a particular refrigerating appliance model has been obtained by calculation on the basis of design, and/or extrapolation from other equivalent refrigerating appliances, the documentation shall include details of such calculations and/or extrapolations, and of tests undertaken by suppliers to verify the accuracy of the calculations undertaken (details of mathematical model for calculating performance and of measurements taken to verify this model). Information shall also include a list of all other equivalent refrigerating appliance models whose information has been obtained on the same basis.

Chapter 6
Verification procedure for market surveillance purposes

When performing the market surveillance checks referred to in Article 3 (2) of Directive 2005/32/EC for the requirements set out in Annex II of this Regulation, the authorities of Member State shall apply the verification procedure described in Annex V of this Regulation.

Chapter 7
Repeals

Directive 96/57/EC is repealed from [*one year after the entry into force of this Regulation*].

Chapter 8
Revision

The Commission shall review this Regulation in light of technological progress no later than five years after the entry into force and present the result of this review to the Ecodesign Consultation Forum.

The Commission shall assess the need to adopt specific ecodesign requirements for wine storage appliances no later than two years after the entry into force of this Regulation.

Chapter 9
Entry into force

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

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

Done at Brussels, [.....]

For the Commission
Member of the Commission

STRUCTURE OF THE ANNEXES

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ANNEX I
Definitions applicable for the purposes of Annexes II to V

For the purpose of this Regulation, the following definitions shall apply:

- (a) “compression-type refrigerating appliance” means a refrigerating appliance in which refrigeration is effected by means of a motor-driven compressor;
- (b) “absorption-type refrigerating appliance” means a refrigerating appliance in which refrigeration is effected by an absorption process using heat as energy source;
- (c) “other-type refrigerating appliances” means a refrigerating appliance in which refrigeration is effected by any other technology or process;
- (d) "frost-free system" means a system automatically operated to prevent the permanent formation of frost, in which cooling is provided by forced air circulation, the evaporator or evaporators are defrosted by an automatic defrost system and the water from defrosting is disposed of automatically;
- (e) “frost-free refrigerator” means a refrigerator, other than a single-compartment refrigerator, in which all compartments are automatically defrosted with automatic disposal of the defrosted water and at least one compartment is cooled by a frost-free system and at least one is a “frozen-food storage” compartment;
- (f) “frost-free refrigerator-freezer” means a refrigerator-freezer in which all compartments are automatically defrosted with automatic disposal of the defrosted water and at least one compartment is cooled by a frost-free system;
- (g) “frost-free frozen-food storage cabinet” means a frozen-food storage cabinet in which all compartments are automatically defrosted with automatic disposal of the defrosted water and which is cooled by a frost-free system;
- (h) “frost-free food freezer” means a food freezer in which all compartments are automatically defrosted with automatic disposal of the defrosted water and at least one compartment is cooled by a frost-free system;
- (i) “built-in appliance” means a fixed refrigerating appliance intended to be installed in a cabinet, in a prepared recess in a wall or similar location, with the need of furniture finishing;
- (j) “refrigerator-cellar” means a refrigerating appliance where at least a fresh food storage compartment and another compartment, different from a frozen food storage compartment or a chill compartment, are present;
- (k) “cellar” means a refrigerating appliance where only one or more cellar compartment(s) is present;
- (l) “refrigerator-chiller” means a refrigerating appliance where at least a fresh food storage compartment and a chill compartment, but no frozen food storage compartments, are present;
- (m) "compartments" means any of the compartments listed in points (n) to (t);
- (n) "fresh-food storage compartment" means a compartment designed for the storage of unfrozen foodstuffs, which may itself be divided into sub-compartments.
- (o) "cellar compartment" means a compartment intended for the storage of particular foodstuffs or beverages at a temperature warmer than that of the fresh-food storage compartment;

- (p) "chill compartment" means a compartment intended specifically for the storage of highly perishable foodstuffs;
- (q) "ice-making compartment" means a low-temperature compartment intended specifically for the freezing and storage of ice;
- (r) "frozen-food storage compartment" means a low-temperature compartment intended specifically for the storage of frozen foodstuffs; frozen-food storage compartments are classified according to temperature in:
 - (i) "one-star compartment": a frozen-food storage compartment in which the temperature is not warmer than - 6 °C;
 - (ii) "two-star compartment": a frozen-food storage compartment in which the temperature is not warmer than - 12 °C;
 - (iii) "three-star compartment": a frozen-food storage compartment in which the temperature is not warmer than - 18 °C;
 - (iv) "food freezer compartment" (named also "four-star compartment"): a compartment suitable for freezing foodstuffs from ambient temperature down to -18°C, and which is also suitable for the storage of frozen food under three-star storage conditions. Two-star sections may exist within the compartment; the rated freezing capacity shall be at least 4,5 kg per 100 l of its storage volume in 24 hours, and in no case less than 2 kg;
 - (v) "0-star compartment": a frozen-food storage compartment in which the temperature is <0°C and that can be used also for the freezing and storage of ice but it is not intended for the storage of highly perishable foodstuffs
- (s) "wine storage compartment" means a compartment exclusively designed either for short term wine storage to bring wines to the ideal drinking temperature, or for long term wine storage to allow wine to mature, having the following characteristics:
 - (i) capacity to maintain continuously a storage temperature in the range from +5 °C to +20 °C, either pre-set in the compartment or capable of being set by a user, according to the manufacturer's instruction;
 - (ii) capacity to maintain each storage temperature within a variation over time of less than 0,5 K at each declared ambient temperature specified by the climate class for refrigerating appliances (in Table 6)
 - (iii) active or passive control of the compartment humidity in the range 50-80%;
 - (iv) construction to reduce the transmission of vibration to the compartment, whether from the refrigerator compressor or from any external source.
- (t) "multi-use compartment" means a compartment intended for use at two or more of the temperatures of the compartment types and capable of being set by a user to continuously maintain the operating temperature range applicable to each compartment type according to the manufacturer's instructions;

where a feature can shift temperatures in a compartment to a different operating temperature range for a period of limited duration only (such as a fast freeze facility) that feature does not qualify the compartment as multi-use.
- (u) "other compartment" means a compartment intended for the storage of foodstuffs at a temperature warmer than that of a cellar compartment;

- (v) “two-star section” means part of a food-freezer or a food-freezer compartment or three-star compartment or three-star frozen-food storage cabinet, which is not self-contained (that is, does not have its own individual access door or lid) and in which the temperature is not warmer than -12 °C;
- (w) “convenience feature” means an enclosure, or a container either fixed or removable by the user in which suitable storage conditions, which may be different from those of the compartment in which it is located, are provided for designated types of foodstuffs; a fixed convenience feature is one which is not intended to be removed;
- (x) “chest freezer”, means a food freezer in which either the compartment(s) are accessible from the top or in which top-opening type and upright type compartments are present and where the gross volume of the top-opening type compartment(s) exceeds 75% of the total gross volume of the appliance;
- (y) “top-opening type” or “chest’ type”, means a refrigerating appliance in which the compartment(s) are accessible from the top or a compartment accessible from the top
- (z) “upright type”, means a refrigerating appliance in which the compartment(s) are accessible from the front or a compartment accessible from the front
- (aa) “Fast freeze” means a reversible feature or a function to be activated by the user according to the manufacturer’s instructions, that decreases the storage temperature of the freezer or the freezer compartment to achieve a faster freezing of unfrozen foodstuffs.

ANNEX II
Ecodesign requirements for household refrigerating appliances

For the purposes of Annex II, the definitions set out in Annex I shall also apply.

1. GENERIC ECODESIGN REQUIREMENTS

(1) Stage 1:

- (a) For wine storage appliances, the following information shall be provided in the instruction booklet and on top of the appliances at the point of sale in a clearly visible way as defined in Chapter 2(7): *“This appliance is intended to be used exclusively for the storage of wine”*.
- (b) Indications shall be provided in the instruction booklet about the combination of drawers, baskets and shelves that result in the most efficient use of energy for the appliance.

(2) Stage 2:

- (a) The fast freezing facility, or any similar function achieved through the modification of the appliance or compartment(s) thermostat(s) setting, in freezers and freezer compartments, shall, once activated by the user according to the manufacturer’s instructions, be automatically reverted to the previous normal storage temperature conditions after no more than 72 hours. This requirement does not apply to refrigerating-freezers with one thermostat and one compressor equipped with an electromechanical control board.
- (b) Refrigerator-freezers with one thermostat and one compressor which are equipped with an electronic control board and can be used in cool ambient temperatures below 16°C according to the manufacturer's instructions, shall ensure that any winter setting switch or similar function guaranteeing the correct frozen food storage temperature is automatically operated according to the ambient temperature where the appliance is installed.
- (c) Refrigerating appliances with a storage volume below 10 litres shall, once activated by the user, automatically enter into operating conditions with a power consumption of 0,00 Watt after no more than 1 hour when empty. The mere presence of a hard-off switch is not considered sufficient to fulfil this requirement.

2. SPECIFIC ECODESIGN REQUIREMENTS

Refrigerating appliances, with a storage volume equal to or higher than 10 litres, shall comply with the maximum allowable annual energy consumption expressed in terms of Energy Efficiency Index (EEI) as provided in Table 1.

The specific eco-design requirements in Table 1 shall not apply to:

- wine storage appliances; or
- absorption-type refrigerating appliances and other-type refrigerating appliances belonging to Categories from 4 to 9 as set in Annex III, Part 1.

The Energy Efficiency Index of refrigerating appliances is calculated in accordance with the procedure described in Annex III.

Table 1

Application date	Maximum Energy Efficiency Index (EEI)	
	Compression-type refrigerating appliances	Absorption-type and Other-type refrigerating appliances
Stage 1	EEI < 55	EEI < 150
Stage 2	EEI < 42	EEI < 125
Stage 3	EEI < 42	EEI < 110

ANNEX III
Method for calculating the Energy Efficiency Index

The energy consumption of a refrigerating appliance depends on its category and climate class, its volume and construction characteristics (thickness of insulation, compressor efficiency, defrosting characteristics, etc.).

In setting minimum energy efficiency requirements, allowances must therefore be made for the main endogenous factors which influence energy consumption.

For this reason, energy consumption is established by a linear equation which is based on the volume of the appliance, with different equations laid down for each category of appliance. To calculate the maximum allowable EEI of a given appliance, it must therefore first be allocated to the appropriate Category.

The Energy Efficiency Index of a refrigerating appliance is the ratio between its estimated annual energy consumption and the standard annual energy consumption, which is considered as the reference energy consumption of refrigerating appliances.

1. CLASSIFICATION OF REFRIGERATING APPLIANCES

Refrigerating appliances are classified in ten categories and four climate classes as shown in Tables 1 and 2. Refrigerating appliances may be classified in more than one climate classes. Each category is defined by the specific compartment composition as specified in Table 3 and is independent from the number of doors, external drawers and compartments. An external drawer is equivalent to a door.

Table 1: Refrigerating appliances categories

Category	Designation
1	Refrigerator without other compartments
2	Refrigerator-cellar, Cellar and Wine storage appliances
3	Refrigerator-chiller and Refrigerator with a 0 star compartment
4	Refrigerator with a 1 star compartment
5	Refrigerator with a 2 star compartment
6	Refrigerator with a 3 star compartment
7	Refrigerator-freezer
8	Upright freezer
9	Chest freezer
10	Multi-use and other refrigerating appliances

If the compartment(s) temperature does not allow the classification of the appliance in one of the Categories from 1 to 9, or in case of multi-use cabinets, Category 10 shall be selected.

Table 2: Climate classes

Class	Symbol	Ambient average temperature °C
Extended temperate	SN	+ 10 to +32
Temperate	N	+16 to +32
Subtropical	ST	+16 to +38
Tropical	T	+16 to +43

Table 3: Refrigerating appliance classification and relevant compartment composition

Storage temperature range (°C)	> +14	+20 / +5 ^a	+14 / +8	+8 / +3	+3 / -2 °C	< 0 / > -6	< -6	< -12	< -18	< -18	Category (number)	
Nominal temperature (for the EEI) (°C)	Design T	+12	+12	+5	0	0	-6	-12	-18	-18		
Compartments types	Other ^c	Wine storage	Cellar	Fresh food storage	Chill	0star/ Ice making	1 star	2 star	3 star	4 star		
Appliance Category	Compartments composition											
REFRIGERATOR WITHOUT OTHER COMPARTMENTS	N	N	N	Y	N	N	N	N	N	N	N	1
REFRIGERATOR-CELLAR, CELLAR and WINE STORAGE APPLIANCE	O	O	O	Y	N	N	N	N	N	N	N	2
	O	O	Y	N	N	N	N	N	N	N	N	
	N	Y	N	N	N	N	N	N	N	N	N	
REFRIGERATOR-CHILLER and REFRIGERATOR WITH A 0 STAR COMPARTMENT	O	O	O	Y	Y	O	N	N	N	N	N	3
	O	O	O	Y	O	Y	N	N	N	N	N	
REFRIGERATOR WITH A 1 STAR COMPARTMENT	O	O	O	Y	O	O	Y	N	N	N	N	4
REFRIGERATOR WITH A 2 STAR COMPARTMENT	O	O	O	Y	O	O	O	Y	N	N	N	5
REFRIGERATOR WITH A 3 STAR COMPARTMENT	O	O	O	Y	O	O	O	O	Y	N	N	6
REFRIGERATOR-FREEZER	O	O	O	Y	O	O	O	O	O	O	Y	7
UPRIGHT FREEZER	N	N	N	N	N	N	N	N	O	(Y) ^b	Y	8
CHEST FREEZER	N	N	N	N	N	N	N	N	O	N	Y	9
MULTI-USE AND OTHER APPLIANCES	O	O	O	O	O	O	O	O	O	O	O	10

Notes:

Y = the compartment shall be present; N = the compartment shall not be present; O = the compartment presence is optional;

a) the allowed variation of the storage temperature for wine storage compartments is $\pm 0,5K$ of each storage temperature included in the range +5/+20;

b) includes also the three-star frozen food cabinets;

c) "Other compartment" includes any compartment, other than a wine storage one, with a storage temperature higher than +14°C.

The refrigerating appliance shall be capable of maintaining, simultaneously, the required storage temperatures in the different compartments and the permitted temperature deviations (during the defrost cycle) as defined in Table 4 for the different types of refrigerating appliances and for the appropriate climate classes.

Multi-use appliances and/or compartments shall be capable of maintaining the required storage temperatures of the different compartments' types capable of being set by the user according to the manufacturer's instructions.

Table 4: Storage temperatures

Storage temperatures (°C)							
Other compartment	Wine storage compartment	Cellar compartment	Fresh food storage compartment	Chill compartment	One-star compartment	Two-star compartment/section	Food freezer and three-star compartment/cabinet
t_{om}	t_{wma}	t_{cm}	t_{ma}	t_{cc}	t^*	t^{**}	t^{***}
$>+14$	$+5 \leq t_{cm} \leq +20$	$+8 \leq t_{cm} \leq +14$	$\leq +4$	$-2 \leq t_{cc} \leq +3$	≤ -6	$\leq -12^a$	$\leq -18^a$

- t_{ma} : mean storage temperature of the fresh-food compartment
- t^* , t^{**} , t^{***} : maximum temperatures of the frozen-food storage compartments
- t_{cm} : mean storage temperature of the cellar compartment
- t_{cc} : instantaneous storage temperature of the chill compartment
- t_{wma} : mean storage temperature of the wine storage compartment with a variation of $\pm 0,5K$
- t_{om} : mean storage temperature of the other compartment
- No specific storage temperature is requested for the ice making compartment and for the “0 star” compartment, but storage temperature shall be $< 0^\circ C$
- a) permitted temperature deviations during the defrost cycle: a rise of no more than 3 K during a period that 4 hours or 20% of the duration of the operating cycle, whichever is the shorter.

2. CALCULATION OF THE EQUIVALENT VOLUME

Given that refrigerating appliances contain different compartments maintained at different temperatures which have a significant influence on the overall energy consumption, the maximum allowable EEI is based on the Equivalent Volume, which is the weighted sum of the storage volumes of the different compartments.

The equivalent volume of a compartment is the storage volume of the compartment adjusted to compensate for heat loadings on spaces which are at temperatures other than that of fresh food compartment. The equivalent volume of a refrigerating appliance is the sum of the equivalent volumes of all compartments.

To determine the equivalent volume of a compartment, the volume correction factors shall first be determined as described in Tables 4 and 5:

$$\frac{(25 - T_c)}{20}$$

- The thermodynamic correction factor $\frac{(25 - T_c)}{20}$ is the temperature difference between the nominal temperature of a compartment T_c (Table 2) and the ambient temperature under standard test conditions ($+25^\circ C$) expressed as a ratio of the same difference for a fresh food compartment at $+5^\circ C$. The thermodynamic factors for the compartments described in Annex 1, points (n) to (r) are as in following Table 5:

Table 5: Thermodynamic factors for refrigerating appliance compartments

Compartment	Nominal temperature	$(25-T_c/20)$
Other compartment	design temperature	$\frac{(25-T_c)}{20}$
Cellar compartment/ Wine storage compartment	+12 °C	0,65
Fresh food storage compartment	+5 °C	1,00
Chill compartment	0 °C	1,25
Ice making compartment and 0-star compartment	0 °C	1,25
One-star compartment	-6 °C	1,55
Two-star compartment	-12 °C	1,85
Three-star compartment	-18 °C	2,15
Food freezer compartment (four-star compartment)	-18 °C	2,15

Notes:

- (i) for multi-use compartments, the thermodynamic factor shall be determined by the nominal temperature of the coldest compartment type capable of being set by a user and maintained continuously according to the manufacturer's instructions;
- (ii) for any two-star section (within a freezer) the thermodynamic factor shall be determined considering a temperature of -12 °C;
- (iii) for other compartments the thermodynamic factor shall be determined by the coldest nominal temperature capable of being set by a user and maintained continuously according to the manufacturer's instructions.

Table 6: Value of the correction factors

Correction factor	Value	Conditions
FF (Frost-free)	1,2	for Frost-free (ventilated) frozen food compartments
	1	otherwise
CC (climate class)	1,2	for T class (tropical) appliances
	1,1	for ST class (subtropical) appliances
	1	otherwise
BI (built-in)	1,2	for built-in appliances of under 58 cm in width
	1	otherwise

Notes:

- (i) FF is the volume correction factor for the presence of a 'no frost' function;
- (ii) CC is the volume correction factor for the presence of a given climate class. If a refrigerating appliance is classified into more than one climate class, the climate class with the highest correction factor is used for the calculation of the equivalent volume.
- (iii) BI is the volume correction factor for built in appliances.

The refrigerating appliance equivalent volume, in litre and rounded to the first integer, is then calculated as:

$$V_{eq} = \left[\sum_{c=1}^{c=n} V_c \times \frac{(25 - T_c)}{20} \times FF_c \right] \times CC \times BI$$

where

n is the number of compartment

V_c is the storage volume of the compartment

T_c is the nominal temperature of the compartment in Table 2.

3. CALCULATION OF THE ENERGY EFFICIENCY INDEX

For the calculation of the EEI, the energy consumption of any given appliance is compared to the reference energy consumption of the same category of appliance with an identical equivalent volume.

The Energy Efficiency Index is calculated as:

$$EEI = \frac{AC}{SC} \times 100$$

and is rounded to the first decimal place

where:

- AC = annual energy consumption of the refrigerating appliance
- SC = standard annual energy consumption of the refrigerating appliance.

The Annual Energy Consumption AC of a refrigerating appliance is calculated, in kWh/year and rounded to two decimal places, as:

$$AC = E_{24h} \times 365$$

where E_{24h} is the energy consumption of the refrigerating appliance in kWh/24h and rounded to three decimal places.

The Standard Annual Energy Consumption SC of a refrigerating appliance is calculated, in kWh/year and rounded to two decimal places, as:

$$SC = V_{eq} \times M + N + CH$$

where:

- V_{eq} is the equivalent volume of the refrigerating appliance
- CH is an allowance equal to 50 kWh/year given to appliances with a chill compartment of at least 15 litres
- M and N values depend from the appliance category as in following Table 6:

Table 7: M and N values by appliance category

Category	M	N
1	0,233	245
2	0,233	245
3	0,233	245
4	0,643	191
5	0,450	245
6	0,777	303
7	0,777	303
8	0,539	315
9	0,472	286
10	a	a

^a for Category 10 refrigerating appliances the M and N values depend on the temperature and the star rating of the compartment with the lowest storage temperature capable of being set by a user and maintained continuously according to the manufacturer's instructions. When only other compartment as defined in Table 3 is present, M and N values for Category 1 shall apply.

ANNEX IV
Measurements

For the purposes of compliance and verification of compliance with the requirements of this Regulation, measurements shall be made using a reliable, accurate and reproducible measurement procedure, which takes into account the generally recognised state of the art. They shall fulfil all of the following conditions.

1. TEST PROCEDURE AND MEASUREMENT ACCURACY

Measurements shall be made within the accuracy prescribed in Table 1.

Table 1

Measured parameter	Measurement accuracy
Rated gross volume	The measured value shall not be less than the rated value by more than 3 % or 1 l, whichever is the greater value.
Rated storage volume	The measured value shall not be less than the rated value by more than 3% or 1 l, whichever is the greater value. Where the volumes of the cellar compartment and fresh food storage compartment are adjustable, relative to one another by the user, this measurement uncertainty applies when the cellar compartment is adjusted to its minimum volume.
Freezing capacity	The measured value shall not be less than the rated value by more than 10 %.
Energy consumption	The measured value shall not be greater than the rated value (E_{24h}) by more than 10 %.
Power consumption of storage appliances with a storage volume below 10 litre	The measured value shall not be greater than the limit value laid down in Annex II, Part 1, 2c) by more than 0,10 W at the 95% confidence level.
Wine storage appliances	The value measured for the relative humidity shall not exceed the nominal range by more than 10 %.

2. GENERAL CONDITIONS FOR TESTING:

The following general conditions for testing apply:

- (1) if anti-condensation heaters which can be switched on and off by the user are provided, they shall be switched on and - if adjustable - set at maximum heating;

- (2) if 'through the door devices' (such as ice or chilled water/drinks dispenser) which can be switched on and off by the user are provided, they shall be switched on during the energy consumption measurement but not operated;
- (3) for multi-use appliances and compartments, the storage temperature during the measurement of the energy consumption shall be the taken as the coldest compartment type nominal temperature claimed for continuous normal use according to the manufacturer's instructions;
- (4) the energy consumption of a refrigerating appliance shall be determined in the coldest configuration, according to the manufacturers instruction for continuous normal use for any 'other compartment' as defined in Annex III, Table 5.

3. TECHNICAL PARAMETERS

The parameters below shall be established as indicated:

- (a) "overall dimensions" which are the height, width and depth of the rectangular parallelepiped, whose base is horizontal, of the refrigerating appliance so as to include the complete appliance except for the handle - the protrusion of which, if any, is to be specified separately;
linear dimensions are measured to the nearest millimetre;
- (b) "overall space required in use", which is the height, width and depth, including the handle, and the space necessary for free circulation of the cooling air when the refrigerating appliance is in service, plus the space necessary to allow for the opening of the means of access to that minimum angle which enable the removal of all removable parts such as containers and shelves, including a drip tray that has to be removed and any water that has to be emptied manually;
linear dimensions are measured to the nearest millimetre;
- (c) "total gross volumes(s)", which is calculated by dividing the total volume into convenient units of volumes of geometric shapes, which can easily be measured; when the gross volume is determined, internal fittings such as shelves, removable partitions, containers, evaporators, temperature control devices and interior light housings shall not be included in that measurement; however, the gross volume shall take into account the exact shapes of the walls if they contain depressions or projections;
calculated volume is measured to the nearest whole number of cubic decimetres or of litres;
- (d) "storage volume(s) and total storage volume(s)", which is the sum of the storage volumes of all compartments, including two-star section(s), as applicable; for the determination of storage volumes, the total volume of devices and spaces considered unusable for the storage of food is deducted from the gross volume;
calculated volume is measured to the nearest whole number of cubic decimetres or of litres;
- (e) "defrosting type", which is the way the frost is eliminated from the refrigerating appliance; it is assessed for each compartment, except for frost-free refrigerating appliances; possible defrosting types include automatic defrost, semi-automatic defrost, manual defrost (with automatic or manual removal of the defrost water) and adaptive defrost;

- (f) "storage temperature", which is the storage temperature of each compartment type in accordance with Annex III, Table 4, to be maintained simultaneously and within the temperature deviations (during the defrost cycle) given in that Table in all the compartments of the refrigerating appliance for the relevant climate class;
- (g) "energy consumption" which is the electric energy (in kilowatt hour) consumed by the refrigerating appliance in the unit of time. The energy consumption is either measured per 24h, or it is calculated for a period of exactly 24h from measured values, and is expressed in kilowatt hours per 24 h (kWh/24h), to three decimal places;
- (h) "temperature rise", which is the time needed for the temperature to rise from -18°C to -9°C in a frozen-food storage cabinet or compartment, or food freezer cabinet or three-star compartment;
- (i) "freezing capacity", which is the mass which can be frozen to a temperature of -18°C in 24 hours in food freezers and food freezer compartments according to manufacturer's instructions, without affecting the storage temperature of other compartments within the meaning of Annex III, Table 4;
- (j) "power consumption": power consumption data is measured in Watts rounded to two decimal places;
- (k) "wine storage compartment humidity": the relative humidity of each compartment is measured and expressed as percentage rounded to the integer.

ANNEX V
Verification procedure for market surveillance purposes

For the purposes of checking conformity with the requirements laid down in Annex II, Member States authorities shall test a single refrigerating appliance. If the measured parameters do not meet the declared values within the meaning of Chapter 5(2) of the supplier within the range defined in Annex IV, table 1, the measurements shall be made on three more refrigerating appliances. The arithmetical mean of the measured values of these three refrigerating appliances shall meet the requirements within the range defined in table 1.

Otherwise, the model and all other equivalent refrigerating appliance models as defined in Chapter 2 (10) shall be considered not to comply.

In addition to the procedure set out in Annex IV, Member States shall use accurate and reliable state-of-the-art measurement methods which deliver reproducible results, including:

- where available, harmonised standards the reference number of which have been published for that purpose in the Official Journal of the European Union in accordance with Articles 9 and 10 of Directive 2005/32/EC;
- otherwise, the methods described in the documents listed in Table 1.

Table 1

Measured parameter	Organisation	Reference	Title
Terms and symbols	Cen/Cenelec	Clause 3 of EN 153 (Clause 3 of EN ISO 15502:2005)	Methods of measuring the energy consumption of electric mains operated household refrigerators, frozen food storage cabinets, food freezers and their combinations, together with associated characteristics
Refrigerator-freezers having one or more, user-adjustable temperature control devices	Cen/Cenelec	Clause 4.2 of EN ISO 15502:2005	Household refrigerating appliances. Characteristics and test methods
Collection and disposal of defrost water	Cen/Cenelec	Clause 5 of EN 153 (Clause 5.6 of EN ISO 15502:2005)	Methods of measuring the energy consumption of electric mains operated household refrigerators, frozen food storage cabinets, food freezers and their combinations, together with associated characteristics
Storage temperatures	Cen/Cenelec	Clause 6 of EN 153 (Clauses 6 of EN ISO 15502:2005), where in contrast Table 4 in Annex III shall prevail	
Determination of linear dimensions, volumes and areas	Cen/Cenelec	Clause 7 of EN 153 (Clause 7 of EN ISO 15502:2005)	
General test conditions	Cen/Cenelec	Clause 8 of EN 153, where in contrast conditions set in Annex IV, Part 2 shall prevail	

Storage temperatures	Cen/Cenelec	Clause 13 of EN 153 (Clause 13 of EN ISO 15502:2005)	
Energy consumption	Cen/Cenelec	Clause 15 of EN 153	
Temperature rise	Cen/Cenelec	Clause 16 of EN 153 (Clause 16 of EN ISO 15502:2005)	
Freezing capacity	Cen/Cenelec	Clause 17 of EN 153 (Clause 17 of EN ISO 15502:2005)	
Final test report	Cen/Cenelec	Clause 19 of EN 153, where in contrast the definitions and rounding indications of Annex IV, Part 3 shall prevail	
Built-in refrigerating appliances	Cen/Cenelec	Annex D of EN 153	
Rated characteristics and control procedure	Cen/Cenelec	Annex E of EN 153	
Element for the test Report Marking	Cen/Cenelec	Clauses 20 and 21 of EN 153 (Clause 20 and Clause 21.2, 21.2, 21.3 and 21.4 of EN ISO 15502:2005)	Household refrigerating appliances. Characteristics and test methods
Noise	International Electro-technical Commission	prEN 60704-2-14 (IEC 60704-2-14:2007)	Refrigerators, frozen-food storage cabinets and food freezers for household and similar use – Measurement of emission of airborne acoustical noise
Power consumption	European Commission	Regulation (EC) No .../.. of [...]	Commission Regulation (EC) No .../.. of [...] implementing Directive 2005/32/EC of the European Parliament and of the Council with regard to ecodesign requirements for standby and off mode electric power consumption of electrical and electronic household and office equipment

The measurement method for wine storage appliances is as follows.

Wine storage performance characteristics

The storage temperature T_{wma} of each compartment shall be included in the range +5°C-+20°C.

T_{wma} is calculated as the average of the temperatures T_{wm1} , T_{wm2} and T_{wm3} of the 3 M-packages (of 500g) to be used in each wine storage compartment:

$$T_{wma} = \frac{T_{wm1} + T_{wm2} + T_{wm3}}{3}$$

The position of the M-packages shall be as in Figure 1.

Each storage temperature shall be maintained within a variation of less than 0,5 Kelvin at each declared ambient temperature specified by the climate class defined for refrigerating appliances in Table 2 of Annex III.

Energy consumption measurement

The energy consumption E_{24h} shall be measured at $T_{wma} = 12^{\circ}\text{C}$. In case interpolation from more than one measurement is used, the procedure set in the table 2 under the title “Energy consumption” applies.

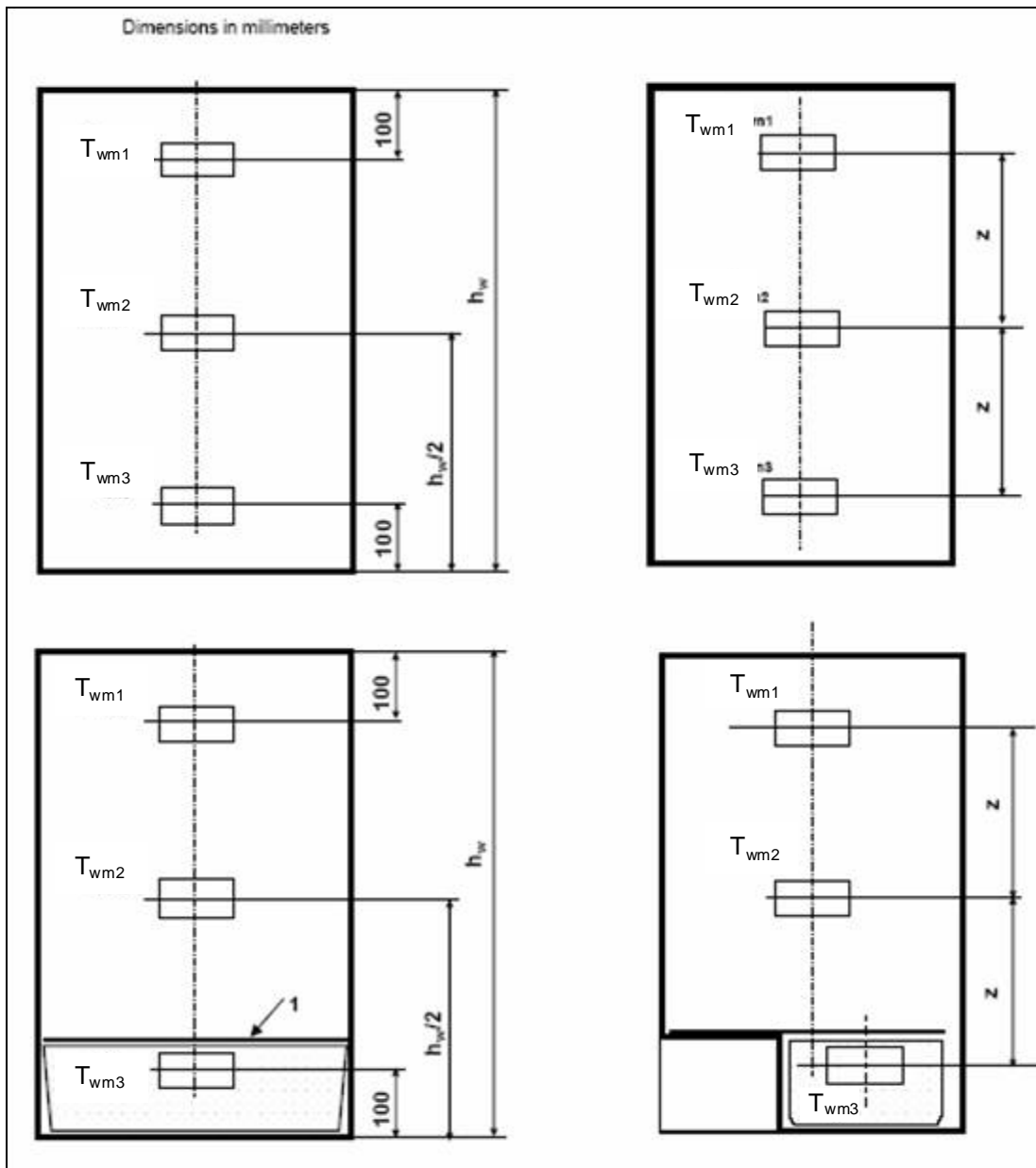
Humidity measurement

The relative humidity of wine storage appliances is measured as follows:

- the relative humidity H_{wm} of each compartment shall be included in the range +50%-+80%.
- H_{wm} is measured by using a humidity sensor placed in the same position as the temperature measurement point T_{wm2} in Figure 1
- For wine storage compartments closed with one door but split by fix or adjustable dividers in separate sub-compartments with independent temperature control the humidity measurement applies for each sub-compartment.
- If $z < 100$ mm (Figure 1), H_{wm} is not measured for the compartment or the sub-compartment.

The relative humidity is expressed as percentage rounded to the integer in accordance with Annex IV, Part 3 (k).

Figure 1: position of the M-packages for the evaluation of the storage temperature T_{wma} in wine storage compartments



Note:

¹shelf above a container placed at lowest possible position

- Temperature measurement points T_{wm} relative to height h_w and internal fittings
- For wine storage compartments closed with one door but split by fix or adjustable dividers in separate sub-compartments with independent temperature control the arrangement applies for each sub compartment.
- If $z < 100$ mm, T_{wm2} shall not be used
- If $h_w < 300$ mm only T_{wm2} shall be used

ANNEX VI
Indicative benchmarks for household refrigerating appliances

At the time of adoption of this Regulation, the best available technology on the market for the products concerned in terms of their Energy Efficiency Index and noise was identified as follows.

Refrigerators, compression-type:

- EEI = 29,7 and an annual energy consumption of 115 kWh/year for a total storage volume of 300 litres of fresh food compartment plus 25 litre of chill compartment, and T (tropical) climate class;
- Noise: 33 dB(A).

Refrigerators, absorption-type:

- EEI = 97,2 and an annual energy consumption of 245 kWh/year for a total storage volume of 28 litres of fresh food compartment, and N (temperate) climatic class;
- Noise = about 0 dB(A).

Refrigerator-freezers, compression-type:

- EEI = 28,0 and an annual energy consumption of 157 kWh/year for a total storage volume of 255 litres, of which 236 litre of fresh food compartment and 19 litre of four-star freezer compartment, and T (tropical) climate class;
- Noise = 33 dB(A).

Upright freezers, compression-type:

- EEI = 29,3 and an annual energy consumption of 172 kWh/year for a total storage volume of 195 litres of four-star freezer compartment, and T (tropical) climate class;
- Noise = 35 dB(A).

Chest freezers, compression-type:

- EEI = 27,4 and an annual energy consumption of 153 kWh/year for a total storage volume of 223 litre of four-star freezer compartment, and T (tropical) climate class.
- Noise = 37 dB(A).