

Working document on possible Commission Regulations implementing Directive 2009/125/EC with regard to professional refrigeration products

Brussels, 09.12.2011

PART 1 – PROFESSIONAL REFRIGERATED CABINETS

Subject matter

This working document pursuant to Directive 2009/125/EC establishes eco-design requirements related to professional refrigerated cabinets. The preparatory study showed that energy in use phase is the only significant environmental aspect which can be addressed through product design. Other Ecodesign parameters referred to in Annex I, Part 1 of Directive 2009/125/EC, are not considered as significant.

Definitions

Professional refrigerated cabinets are considered as energy related products within the meaning of Article 2 (1) of Directive 2009/125/EC.

For the purpose of this working document the following definition shall apply.

A professional refrigerated cabinet is a refrigerated enclosure intended for the storage, but not the sale and display, of chilled and/or frozen foodstuff, accessible via one or more doors and/or drawers.

A professional refrigerator is a professional refrigerated cabinet intended to store and maintain foodstuff at a temperature above 0°C, with reference point at +5°C (M1 temperature class)

A professional freezer is a professional refrigerated cabinet intended to store and maintain foodstuff at a temperature below 0°C, with reference point at -18°C (L1 temperature class)

This includes:

- Professional refrigerated cabinets sold with an integral condenser or intended for use with a remote condenser¹
- Professional refrigerated cabinets equipped with solid or transparent doors

Eco-design requirements

Energy consumption in the use phase is by far the dominating environmental impact over the life cycle. Direct greenhouse gas emissions from refrigerant fluids account for less than 3% of the Total Equivalent Warming Potential (TEWI) of the Base Case over the product lifetime

¹ The preparatory study estimated that 99% of professional refrigerated cabinets include an integral condenser ("plug-in" models)

(8.5 years). This is due to the fact that 99% of cabinets are plug-in appliances, with low annual leakage rate (1%) and small refrigerant charge (0.3-0.4 kg), despite a loss at end-of-life of 100% of the refrigerant charge remaining in the circuit. The use of HC refrigerant fluids has been selected as a valid technical improvement by the preparatory study, and the best available technology identified by the study uses R290. However, while it is technically feasible to use HC refrigerant fluids in professional refrigerated cabinets, mandatory requirements do not seem cost-efficient compared to energy consumption reduction given the minor contribution of direct emissions to TEWI. The aggregated improvement potential from the use of low GWP refrigerants for the products under consideration does not appear sufficient to justify regulatory action under Directive 2009/125/EC.

Products falling under the definitions of paragraph "Definitions" above shall meet the Ecodesign requirements set out in Annexes I and II, including:

- Minimum energy efficiency requirements
- Product information requirements
- Energy labelling requirements

Tier-1 minimum energy efficiency requirements proposed in **Option 1** are based on the approach recommended by the preparatory study. They imply a decrease in energy consumption of 25 to 30% compared to the Base Case. They may lead to an increase in the purchase price of professional refrigerated cabinets by up to 10%. However, the life cycle costs for the users would be reduced by 10-20% over the lifetime of the products (8.5 years). This does not take into account the possible price reduction due to higher demand for more energy efficient cabinets.

Tier-2 requirements in Option 1 are close to the calculated least life cycle cost. This means a decrease in energy consumption of circa 40%, leading to reduced life cycle costs for the users by at least 20% and up to 30%, despite possible price increase of up to 20%.

It is estimated that the proposed requirements will allow saving 2.4 TWh in 2020 and 4.2 TWh in 2025 compared to a "freeze" scenario. They will help putting the EU market at a comparable efficiency level with other major economies (notably the US, Australia, New Zealand and Canada).

However, as spotted by some stakeholders, Option 1 leads to creating several sub-categories of appliances both for Ecodesign requirements and Energy labelling classes, and thus does not allow easy comparison between appliances of different volumes and designs. Therefore, an **Option 2** is also proposed, as indicated in Annexes I, II and III. Option 2 is broadly comparable to Option 1 in terms of stringency of the proposed requirements and energy saving potential. Option 2 may deserve refinement, but its leads to significant simplification compared to the approach recommended by the preparatory study.

On top of the proposed EU requirements, the Commission recommends complementary measures to be taken by national, regional and local authorities. In their public procurement procedures, Member States would be encouraged to require professional refrigerated cabinets with minimum energy efficiency index values corresponding to Tier-2 requirements of Annex I already from 1st January 2014.

Form of the Implementing measure

It is intended to propose a directly applicable Implementing Regulation under Directive 2009/125/EC. The proposed Regulation is not expected to have a particular impact on the EU acquis.

Measurement methods

As regards the method for measuring the total energy consumption (TEC) and net volume of professional refrigerated cabinets, the Commission intends to publish the references of EN441 in the Official Journal, C series.

As a reminder, the following conditions apply under the EN441 test protocol:

- The climate class of the M-package used for the test is M1 (refrigerator) or L1 (freezer)
- The climate class of the ambient conditions is 4 (+30°C and 55% relative humidity)
- The appliance is loaded as indicated in EN441 (i.e. positioning of the M-packages inside the cabinet during the test)
- The net internal volume is defined as the volume containing foodstuffs within the load limit and it is measured as indicated in EN441
- The test has a 48-hour duration
- The door opening protocol is performed as indicated in EN441

Conformity Assessment

A conformity assessment shall be carried out according to Chapter 8 of Directive 2009/125/EC, Annex IV (Internal design control) or Annex V (Management system for assessing conformity).

Market surveillance

When performing the market surveillance checks referred to in Directive 2009/125/EC, Chapter 3 (2), Member State authorities shall apply the verification procedure set out in Annex VI of this working document.

Benchmarks

The benchmarks for best product in terms of energy efficiency are described in Annex V.

Review

A review of the proposed requirements shall be presented to the Consultation Forum depending on technological progress and not later than 4 years after its entry into force.

Annex I: Ecodesign requirements

Option 1

a) Minimum energy efficiency requirements, Tier 1

January 1, 2014 onwards, professional refrigerated cabinets falling into the scope of the present Regulation shall meet the following minimum energy efficiency requirements

Product design	Storage temperature (in °c)	Net volume (in litres)	Energy Efficiency Index*
Upright	Refrigerator	<600	<17.5
		>600	<14.5
	Freezer	<600	<44.5
		>600	<40.0
Under-counter	Refrigerator	Any volume	<24.0
	Freezer	Any volume	<50.0
Chest	Freezer	Any volume	<38.5

*Appliances equipped with transparent or translucent doors shall comply with an EEI value equal to EEI*1.1

b) Minimum energy efficiency requirements, Tier 2

January 1, 2017 onwards, professional refrigerated cabinets falling into the scope of the present Regulation shall meet the following minimum energy efficiency requirements

Product design	Storage temperature (in °c)	Net volume (in litres)	Energy Efficiency Index*
Upright	Refrigerator	<600	<14.0
		>600	<11.5
	Freezer	<600	<38.0
		>600	<37.5
Under-counter	Refrigerator	Any volume	<19.5
	Freezer	Any volume	<40.5
Chest	Freezer	Any volume	<29.5

*Appliances equipped with transparent or translucent doors shall comply with an EEI value equal to EEI*1.1

Option 2

a) Minimum energy efficiency requirements, Tier 1

January 1, 2014 onwards, professional refrigerated cabinets falling into the scope of the present Regulation shall comply with an EEI value of less than 125

Professional refrigerated cabinets which are chest freezers shall comply with an EEI value of less than 100

Professional refrigerated cabinets equipped with transparent or translucent doors shall comply with an EEI value of 137.5

b) Minimum energy efficiency requirements, Tier 2

January 1, 2017 onwards, professional refrigerated cabinets falling into the scope of the present Regulation shall comply with an EEI value of less than 100

Professional refrigerated cabinets which are chest freezers shall comply with an EEI value of less than 75

Professional refrigerated cabinets equipped with transparent or translucent doors shall comply with an EEI value of 110

c) Product information requirements

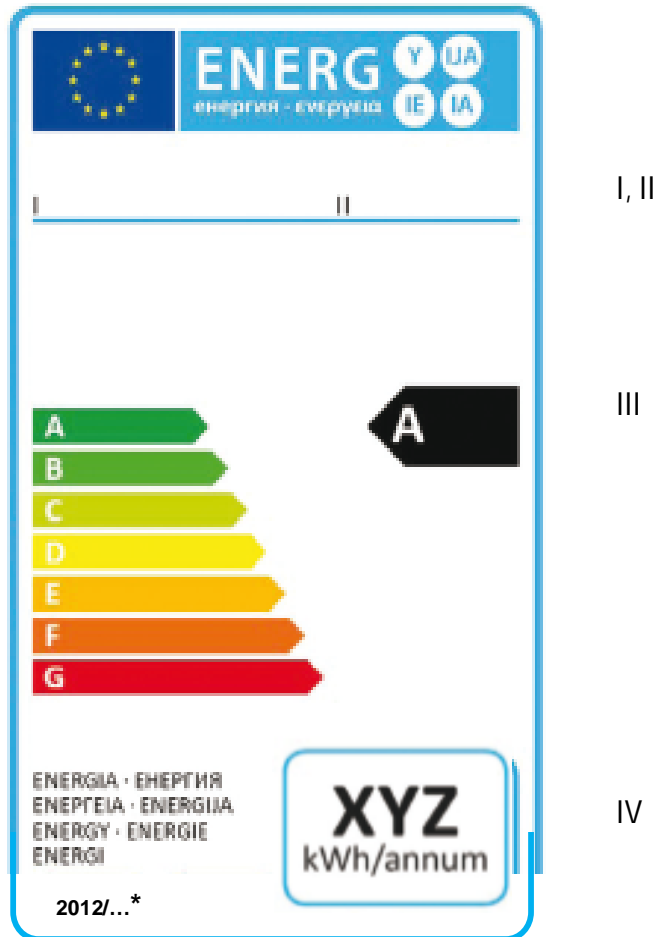
January 1, 2014 onwards, the following parameters shall be reported in the product documentation.

- Net storage volume, in m³ and rounded to three decimal places
For refrigerator-freezer models, the refrigerating net volume, the freezing net volume and the adjusted net volume shall be specified.
- Total energy consumption, in kWh/48h and rounded to one decimal place
- Energy Efficiency Index
- Name and GWP of the refrigerant fluid
- Refrigerant charge, expressed in kg and rounded to three decimal places

Annex II: Energy labelling requirements

1. LABEL FOR PROFESSIONAL REFRIGERATED CABINETS

From January 1, 2014 onwards, professional refrigerated cabinets falling in the scope of the present Regulation shall be accompanied by the following label



[* Numbering of the Regulation to be added on the label before publication to the OJEU]

The following information shall be included in the label:

- I. supplier's name or trade mark;
- II. supplier's model identifier, meaning the specific code which distinguishes a professional refrigerated cabinet model from other models with the same trade mark or supplier's name;
- III. the energy efficiency class as defined in point 2 of Annex II; the head of the arrow containing the energy efficiency class of the professional refrigerated cabinet shall be placed at the same height as the head of the arrow of the relevant energy efficiency class;
- IV. Annual energy consumption (AE_C) in kWh/year, rounded up to the nearest integer and calculated in accordance with Annex III.

2. ENERGY EFFICIENCY CLASSES

January 1st, 2014 onwards, the energy efficiency class of a professional refrigerated cabinet shall be determined in accordance with its Energy Efficiency Index (*EEI*) as set out in Table 1.

Option 1

Table 1: Energy efficiency classes

Product design	Storage temperature	Net volume	Maximum EEI value allowed in each energy efficiency class						
			A	B	C	D	E	F	G
Upright	Refrigerator	<600	7	8.5	9.5	11	13	14	17,5
		>600	6	7	8	9	10.5	13	14,5
	Freezer	<600	24	26	29	32	36	40	44,5
		>600	21	24	26	29	32	36	40,0
Under-counter	Refrigerator	all	13	14	16	17	19	22	24,0
	Freezer		27	30	33	36	41	45	50,0
Chest	Freezer		20	23	25	28	31	35	38,5

Option 2

Table 1: Energy efficiency classes

Energy efficiency class	Energy efficiency index value
G	<125
F	<115
E	<100
D	<85
C	<70
B	<60
A	<50

Annex III: Calculation methods

CALCULATION OF THE ENERGY EFFICIENCY INDEX

Option 1

The Energy Efficiency Index (EEI) of a professional refrigerated cabinet establishes the ratio between the Total Energy Consumption (TEC) in kWh and the net internal volume (V) in m³.

$$EEI = \frac{TEC}{V}$$

Where

- TEC is the total energy consumption of the cabinet over 48 hours, in kWh/48h and rounded to one decimal place
- V is the net internal volume of storage space in the cabinet, in m³ and rounded to three decimal places

$$V = B * H$$

Where

- B is the shelf or drawer base area
- H is the loading height

For refrigerator-freezer models, V is replaced by the adjusted volume Va

$$Va = Vr + 1.63Vf$$

Where

- Vr is the net internal volume of refrigerating storage space
- Vf is the net internal volume of freezing storage space

Option 2

The Energy Efficiency Index (EEI) of a professional refrigerated cabinet establishes the ratio between the Total Energy Consumption (TEC) in kWh and the Standard Energy Consumption (SEC).

$$EEI = \frac{TEC}{SEC} \times 100$$

With

For refrigerators:

$$SEC = 1.8 + 9.5 \times V$$

And for freezers:

$$SEC = 2.0 + 30 \times V$$

Where

V is the net internal volume of storage space in the cabinet, in m³ and rounded to three decimal places

With

$$V = B * H$$

Where

- B is the shelf or drawer base area
- H is the loading height

And

TEC is the total energy consumption of the cabinet over 48 hours, in kWh/48h and rounded to one decimal place

For refrigerator-freezer models, V is replaced by the adjusted volume V_a

$$V_a = V_r + 1.63V_f$$

Where

- V_r is the net internal volume of refrigerating storage space
- V_f is the net internal volume of freezing storage space

Annex IV: Measurement methods

For the purpose 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 measurement methods, including methods set out in documents the reference numbers of which have been published for that purpose in the Official Journal of the European Union.

The appliance shall be tested with all accessories and ancillary equipments such as defrosting and lighting in the on mode and under normal working conditions.

Annex V: Ecodesign Benchmarks

Option 1

January 1, 2014 onwards, the following energy efficiency index (EEI) values are considered as voluntary performance benchmarks under the present Regulation

Product design	Storage temperature (in °c)	Net volume (in litres)	Energy Efficiency Index*
Upright	Refrigerator	<600	7.5
		>600	7
	Freezer	<600	24.5
		>600	23.5
Under-counter	Refrigerator	Any volume	10.5
	Freezer	Any volume	21.0
Chest	freezer	Any volume	16.5

For appliances equipped with transparent or translucent doors, the EEI value is equal to EEI*1.1

Annex VI: Verification procedure for market surveillance purposes

For the purposes of checking conformity with the requirements laid down in Annex I, Member State authorities shall test a single professional refrigerated cabinet. If the measured parameters do not meet the values declared by the supplier within the ranges set out in Table 1, the measurements shall be carried out on three more professional refrigerated cabinets. The arithmetic mean of the measured values of these three professional refrigerated cabinets shall meet the values declared by the supplier within the range defined in Table 1.

Otherwise, the model and all other equivalent professional refrigerated cabinet models shall be considered not to comply with the requirements laid down in Annex I (Ecodesign requirements) and –where appropriate—Annex II (Labelling requirements).

Member States authorities shall use reliable, accurate and reproducible measurement procedures, which take into account the generally recognised state-of-the-art measurement methods, including methods set out in documents the reference numbers of which have been published for that purpose in the Official Journal of the European Union.

Table 1.

Measured parameter	Verification tolerances
Net Internal Volume	The measured value shall not be greater than the rated value of V or V_a by more than 5 %.
Total Energy Consumption	The measured value shall not be greater than the rated value of TEC by more than 5 %.