

Recommendations for proposed ecodesign measures and energy label for professional storage cabinets (refrigerators and freezers)

Eva Geilinger, June 2013, updated November 2013

1. Summary

In June 2013 draft regulations proposing ecodesign measures and an energy label for professional storage cabinets (refrigerators and freezers) were circulated for consultation. We looked at the proposals and compared them with the best available technology that is on the current Topten product lists under www.topten.eu. Concluding, we worked out 8 recommendations that can improve the ecodesign and labelling regulations. The table of content below gives an overview over the 8 recommendations. Topten is guided by two main concerns: the regulations shall enable a significant and speedy market shift to high energy efficiency models and initiate widespread use of climate-friendly refrigerants in professional storage cabinets. A recommendation for blast cabinets was also worked out. We were happy to see that the draft regulations had been improved since last time. Overall the proposals are promising and should be adopted and applied with no delay - the sooner the better. **Updated with new product data (A+ and A++ vertical cabinets!) in November 2013.**

Table of content

1. Summary	1
2. Introduction	1
3. Best available technology on www.topten.eu : 80 models with top energy efficiency classes and climate-friendly refrigerants	2
4. Draft energy labelling regulation	3
Recommendation 1: Start labelling 1 year earlier	3
Recommendation 2: Indicate whether the refrigerant has high GWP or not	4
Recommendation 3: Adjust EEI calculation method for both vertical and counter cabinets	5
Recommendation 4: Label refrigerator-freezers as well	5
5. Draft ecodesign regulation	5
Recommendation 5: Avoid loopholes, no exemption for transparent doors	5
Recommendation 6: Set stricter requirements for energy efficiency	6
Recommendation 7: Provide product information 1 year earlier	6
Recommendation 8: Update indicative benchmarks and adjust calculation method	6
6. Recommendation for blast cabinets	7
7. Useful links	8

2. Introduction

Ecodesign measures for professional refrigeration products (professional storage cabinets, blast cabinets, condensing units and low and medium temperature process chillers) are currently being worked out; the first stages of requirements are planned to apply from July 2015. Underlying documents are the preparatory study (DG ENTR Lot 1) that was finished in 2011 and an impact assessment study that was done between January and September 2012.

Draft regulations were first circulated in December 2011 and June 2012 and now again in June 2013 for a three week so-called interservice consultation before the notification of WTO. Energy labelling is only proposed for professional storage cabinets; for the other product groups solely ecodesign measures are proposed.

The newest draft regulations from June 2013 have been improved in a number of ways compared to the last ones. To name a few Topten welcomes particularly that :

- ✓ Energy efficiency classes have been better fitted to high-efficiency models on the market
- ✓ Product information shall include the global warming potential (GWP) of the refrigerant
- ✓ The measurement method for energy consumption and net volume is described in detail

Note that display cabinets for selling foodstuff with direct customer access (open or glass covers) belong to a different lot: DG ENER Lot 12. The policy process is less progressed, DG ENER with assistance from Joint Research Centre JRC are currently updating the preparatory study (2007) and impact assessment study (2010).

Note also that high temperature process chillers are planned to be regulated together with air conditioning chillers under a separate measure by DG ENER.

3. Best available technology on www.topten.eu: 80 models with top energy efficiency classes and climate-friendly refrigerants

Topten provides online product lists showing the best available technology for professional storage cabinets. Energy efficiency index and class are calculated according to the newest draft regulation for all models. All presented models meet the technical criteria defined by Topten, the criteria being¹ :

- 1) Declaration of energy consumption according to a standardized test protocol (CEN, CECED Italia)
- 2) Top energy efficiency classes according to newest draft regulations (June 2013)
- 3) Refrigerant with very low global warming potential (GWP): R-600a/isobutane or R-290/propane

In total 80 models of 4 brands (Electrolux Professional, Gram/Snowflake, Liebherr, Porkka) are shown under www.topten.eu > Professional Refrigerators. They all use R-600a/isobutane or R-290/propane as refrigerant. Table 1 shows the energy efficiency classes and number of models for each product type. The Topten product lists help to picture the impact of the proposed ecodesign measures and energy label.








Product types and links to lists	Image (example)	Top energy efficiency classes	Number of listed models
http://www.topten.eu/?page=storage-refrigerators-under-counter		A++, A+++	3
http://www.topten.eu/?page=storage-refrigerators-1-door		B, A, A+	36
http://www.topten.eu/?page=storage-refrigerators-2-doors		C, B	6
http://www.topten.eu/?page=storage-freezers-under-counter		A+	2
http://www.topten.eu/?page=storage-freezers-1-door		B, A+, A++	26
http://www.topten.eu/?page=storage-freezers-2-doors		C, B	6
http://www.topten.eu/?page=storage-combined-refrigerator-freezers		C ²	1

Table 1: Best available technology for professional storage cabinets presented by Topten; overview product types.

¹ Details under <http://www.topten.eu/?page=professional-storage-refrigerators&fromid=>

² When calculated with the method for vertical freezers

4. Draft energy labelling regulation

Starting 1st July 2015 an energy label and a product fiche shall be provided for professional storage cabinets. One year later, from 1st July 2016, A+ shall be added as top class. A++ shall be added in 2018 and A+++ in 2019.

XYZ/2013 - I	XYZ/2013 - II	XYZ/2013 - III	XYZ/2013 - IV
<i>Newest draft regulation from June 2013:</i>			
1 st July 2015	1 st July 2016	1 st July 2018	1 st July 2019
<i>Recommendation Topten:</i>			
1 st July 2014	1 st July 2015	1 st July 2017	1 st July 2018
<i>Last draft regulation from June 2012:</i>			
July 2014	January 2015	January 2016	January 2018

Table 2: Timetable for the energy label in the newest draft regulation. Topten recommends to move the timetable forward by one year. In the last draft regulation it was foreseen to start labelling in July 2014.

The energy efficiency classes are defined as shown in Table 3 :

Energy efficiency index (EEI)	< 15	15-20	20-30	30-40	40-55	55-75	75-90	90-100	100-110	110-125
Energy efficiency class	A+++	A++	A+	A	B	C	D	E	F	G

Table 3: Definition of energy efficiency classes in the newest draft regulation.

Recommendation 1: Start labelling 1 year earlier

Topten recommends to start labelling one year earlier, so in July 2014 as it was initially foreseen in the last regulatory proposal from June 2012. Then the whole timetable could be moved forward by one year. The sooner product information is available the better. It is important to create transparency on the market. The pull for energy efficient models will set in earlier and national energy saving programs as well as customer advising will be backed by broader market data. An increasing number of forward-looking brands already provide similar product information to date. We see no sense in delaying standardized product declaration any longer.

Recommendation 2: Indicate whether the refrigerant has high GWP or not

Topten also recommends to include a straight-forward, easy-to-understand indication whether the refrigerant fluid contained in the cabinet has a high global warming potential (GWP) or not. An icon and/or indication in words on the *label* and in the *product fiche* should be added allowing end-users and procurers well-informed and free choices. Refrigerants with GWP below 40, such as R-600a/isobutane and R-290/propane, should be indicated as “climate-friendly”, others as „refrigerant with high global warming potential“. Topten proposes to add the following texts into the draft regulation :

ANNEX III The labels should be complemented with an indication by icon and/or in words :

VII. the indication „climate-friendly refrigerant“ if global warming potential (GWP) of the refrigerant fluid contained in the cabinet is below 40 or „refrigerant with high global warming potential“ if GWP is 40 or higher

ANNEX IV Product Fiche should be complemented with :

(I) „climate-friendly refrigerant“ if GWP of the refrigerant fluid contained in the cabinet is below 40 or „refrigerant with high global warming potential“ if GWP is 40 or higher followed by the type/name of the refrigerant fluid contained in the cabinet

e.g. : „climate-friendly refrigerant“ : R-600a or :
 „refrigerant with high global warming potential“ : R-134a

ANNEX VI Information to be provided in cases where end-users cannot be expected to see the product displayed should be complemented with :

(e) „climate-friendly refrigerant“ if GWP of the refrigerant fluid contained in the cabinet is below 40 or „refrigerant with high global warming potential“ if GWP is 40 or higher followed by the type/name of the refrigerant fluid contained in the cabinet

(Possibly also the ‘Common definitions’ concerning GWP from the ecodesign working document would have to be copied into the labelling regulation.)

Background refrigerants

To date most commonly used refrigerants for professional storage cabinets are hydrofluorocarbons (HFCs) such as R-134a and R-404A. They do not contribute to ozone depletion like the formerly used chlorofluorocarbons (CFCs), but they have a high global warming potential as shown in Table 4. High-quality professional storage cabinets are often offered with the climate-friendly refrigerants R-600a or R-290, but they have yet to become standard praxis in the whole market and clear-cut product information will be key for this change. In household refrigerators and freezers on the other hand use of R-600a/isobutane and R-290/propane is standard praxis.

Refrigerant	Global warming potential (GWP) compared to CO2 over a 100-year time horizon
R-134a	GWP 1430
R-404A	GWP 3990
Propane/R-290	GWP 3
Isobutane/R-600a	GWP 3
CO2/R-744	GWP 1

Table 4 : Most common refrigerants used in professional storage cabinets and their global warming potential (GWP). CO2 is the basis for GWP comparison and could itself be used as climate-friendly refrigerant; to date although we are not aware of any products using CO2 because there are technical issues yet to be solved (noise, high maintenance etc.).

Recommendation 3: Adjust EEI calculation method for both vertical and counter cabinets

The product lists under www.topten.eu show that there would be already A+ and A++ vertical cabinets and A+, A++ and A+++ counter cabinets on the market if the proposed calculation method were used. Topten recommends to adjust the M and N coefficient values (*ANNEX VII Measurement and calculation methods, Table 2*) so that no known model obtains an EEI of less than 30 (corresponding to class A).

Recommendation 4: Label refrigerator-freezers as well

Chapter 1 Subject matter and scope lists the exemptions from the energy labelling regulation. Topten recommends to also label refrigerator-freezers and therefore to delete "(j) Refrigerator-freezers" from this list. Their energy efficiency index could be calculated with the same method as for vertical freezers (this would tend to give them an advantage since part of their volume is chilled) or a mix of vertical chilled and vertical frozen.

One refrigerator-freezer model is currently listed under <http://www.topten.eu/?page=storage-combined-refrigerator-freezers>. The EEI calculated with the method for vertical freezers is 59.3 corresponding to energy efficiency class C.

5. Draft ecodesign regulation

The draft ecodesign regulation distinguishes between heavy duty and light duty cabinets. Light duty cabinets per definition are capable of maintaining the needed operating temperature in ambient temperature of 25°C and 60% relative humidity (climate class 3), but not in 30°C and 55% relative humidity (climate class 4). Heavy duty cabinets perform well also in ambient conditions corresponding to climate class 4 (typical for restaurant kitchens).

In the draft regulation's annex III the measurement method for energy consumption is described including door openings (corresponding to the CECED Italia test protocol), ambient conditions (climate class 3 for light duty cabinets, climate class 4 for heavy duty cabinets), required temperatures of test packages and more. Also the calculation of the net volume is described in detail.

For heavy duty cabinets one single stage of energy efficiency requirements is proposed from 1st July 2015. Models worse than energy efficiency class G would then be phased out. For light duty cabinets three stages of energy efficiency requirements are proposed :

From 1 July 2015: $EEI < 125$ (phase out worse than G)

From 1 July 2016: $EEI < 110$ (phase out G)

From 1 July 2018: $EEI < 100$ (phase out F)

Product information requirements are proposed from 1st July 2015 and include all needed information to evaluate the energy efficiency of a model as well as the global warming potential of the refrigerant.

Recommendation 5: Avoid loopholes, no exemption for transparent doors

ANNEX I, Definitions related to professional storage cabinets says: "(1) a professional storage cabinet may include one or more partially or wholly transparent door(s) and/or drawers(s), as long as the total transparent area of the cabinet door(s) and/or drawers(s) is not more than 80% of the total door/drawer area". Topten recommends to delete this point. It creates a potential loophole in the requirements for cabinets with over 80% transparent door/drawer area. The definition for 'professional storage cabinet' in *Chapter 2* suffices to distinguish between professional storage cabinets and display cabinets. It is not clear for what reason professional storage cabinets with over 80% transparent door/drawer area should be exempted from the ecodesign requirements in Annexes II to XI.

Recommendation 6: Set stricter requirements for energy efficiency

Since there are many heavy duty cabinets available to date with EEI well below 55 (as shown in the Topten product lists) it seems not justified to set the requirements for energy efficiency at only $EEI < 125$ (keeping models worse than energy efficiency class G from the market). This proposal would leave models on the market with 2.3 times the energy consumption compared to other models with the same net volume. Topten recommends to set stricter requirements for energy efficiency and phasing out class E in 2018.

Topten also recommends to set stricter requirements for light duty cabinets than for heavy duty cabinets. Light duty cabinets are tested in less demanding ambient conditions for the energy consumption measurement (30°C, 55% relative humidity for heavy duty cabinets, 25°C 60% relative humidity for light duty cabinets) and will therefore reach better EEIs.

Refrigerator-freezers should not be exempted from the requirements. The Topten list shows that it is possible for refrigerator-freezers to obtain energy efficiency class C (see <http://www.topten.eu/?page=storage-combined-refrigerator-freezers>).

Topten proposes the following changes to the draft ecodesign regulation:

ANNEX II, 1. Requirements for energy efficiency should be replaced with :

(a) Professional storage cabinets within the scope of this Working Document, with the exception of heavy duty cabinets and refrigerator-freezers, shall comply with the following Energy Efficiency Index (EEI) limits:

- i) From 1 July 2015: $EEI < 100$ (phase out F)
- ii) From 1 July 2016: $EEI < 90$ (phase out E)
- iii) From 1 July 2018: $EEI < 75$ (phase out D)

(b) Heavy duty cabinets and refrigerator-freezers shall comply with the following Energy Efficiency Index (EEI) limits:

- i) From 1 July 2015: $EEI < 110$ (phase out G)
- ii) From 1 July 2016: $EEI < 100$ (phase out F)
- iii) From 1 July 2018: $EEI < 90$ (phase out E)

The Energy Efficiency Index (EEI) of professional storage cabinets is calculated in accordance with the method described in Annex IV.

Recommendation 7: Provide product information 1 year earlier

Topten recommends to apply product information requirements one year earlier, so in July 2014 as it was initially foreseen in the last regulatory proposal from June 2012. We recommend this for the same reasons as to start labelling in July 2014 as well (see Recommendation 1: Start labelling 1 year earlier).

Recommendation 8: Update indicative benchmarks and adjust calculation method

New products listed under www.topten.eu challenge the identified best available technology in *ANNEX XII Indicative Benchmarks*. For comparison the models with the lowest EEI in the Topten product lists are shown in Table 5. Their EEI is up to 50% lower. Topten recommends to update the indicative benchmarks.

	net storage volume (litres)	Annual energy consumption (kWh)	EEI
Chilled vertical	600	474.5 ³	29.7
Chilled counter	300	547.5	21.4
Frozen vertical	600	1825	41.2
Frozen counter	200	1460	41.0
<i>Models with lowest EEI in Topten product lists :</i>			
Chilled vertical	501	288	20.1
Chilled counter	104	279	13.6
Frozen vertical	501	767	19.5
Frozen counter	104	772	25.8

Table 5: Best available technology on the market for professional storage cabinets in terms of their Energy Efficiency Index (EEI) identified in the draft regulation and below the models with the lowest EEI in the Topten product lists.

In line with recommendation 3 above Topten recommends to adjust the M and N coefficient values (*ANNEX IV Method for calculating the Energy Efficiency Index for professional storage cabinets, Table 3*) so that no known model obtains an EEI of less than 30 (corresponding to class A).

6. Recommendation for blast cabinets

Blast cabinets (intended to rapidly cool hot foodstuff down to below 10°C or -18°C) are addressed in the draft ecodesign regulation. No energy efficiency requirements are foreseen, but indicative product information from 1st July 2016 (full load capacity, standard temperature cycle, energy consumption and, in the case of integral equipment, type, name and GWP of the refrigerant).

They are not (yet) part of the work done by Topten and strictly speaking not in the focus of these policy recommendations. Nonetheless Topten recommends to apply product information requirements one year earlier, so starting July 2015 as initially foreseen in the last regulatory proposal from June 2012. This would enable transparent product comparison and create knowledge on energy efficiency potentials in the first place. Without this knowledge energy saving initiatives have nothing to build on.

³ There also seems to be a mistake with the numbers in the table; chilled vertical with 600 litres net volume hardly has lower annual energy consumption than chilled counter with 300 litres net volume.

7. Useful links

Draft ecodesign and labelling regulations from June 2013, DG ENTR:

<http://www.topten.eu/uploads/File/CF-Ecodesign-Lot1-June2013.pdf>

<http://www.topten.eu/uploads/File/CF-Labeling-Lot1-June2013.pdf>

Impact Assessment study on DG ENTR Lot 1 products (professional refrigeration equipment):

http://www.taitconsulting.co.uk/Ecodesign_Consultation.html

Of special interest is the appendix on refrigerants of the Impact Assessment Reports!

Preparatory study on Refrigerating and Freezing Equipment (DG ENTR Lot 1):

<http://www.ecofreezercom.org>

Draft regulations and position papers of NGOs: <http://env-ngo.eup-network.de>

Initiatives in Europe:

Enhanced Capital Allowance Scheme; Product list 'Refrigerated Display Cabinets' (Energy Technology List ETL): <http://etl.decc.gov.uk/etl>

CECED Italia Test protocol for professional refrigerators and freezers (> E.C.E. Labelling):

<http://www.ceceditalia.it/>

Rebate programme in Switzerland for plug-in professional refrigerators and freezers (both storage and display cabinets): <http://www.topten.ch/gewerbe> (DE) / <http://www.topten.ch/professionnel> (FR)