

Energy label for professional refrigerated cabinets

Eva Geilinger, January 2012

1. Summary

Based on data analysis, Topten recommends to make energy efficiency classes more stringent.

Product data from two government programmes in the United Kingdom and Denmark reveal that there are already several refrigerators in class A. Experience with other appliances shows that introducing an energy label leads to a leap in efficiency technologies. To give innovative products the credit they deserve, class A must be “empty” at introduction of the label. Otherwise the pull effect for further efficiency improvements is lost.

Minimum energy efficiency requirements (MEPS) for Tier 1 will only lead to energy savings if the worst-performing products are banned from the market. With the draft regulation as is, all products will stay on the market. It is therefore necessary to make class limits more stringent.

Topten proposes specific refinements to make energy label and MEPS more stringent (e.g. new definitions of Standard Energy Consumption SEC). The data is plotted both with the draft regulation and with the Topten proposal.

2. Introduction

An energy label, product information requirements including refrigerant fluids and minimum energy efficiency requirements (MEPS) are planned for 2014 (Tier 2 in 2017). Comprehensive data on energy consumption of professional refrigerated cabinets exists in the framework of government programmes in the United Kingdom and Denmark. Topten looked into the proposal using this data and discovered how the energy label could be further improved and refined.

Characteristics of professional refrigerated cabinets:

- used to store foodstuff (contrary to ‘commercial’ refrigerated cabinets used to display and sell foodstuff)
- intended exclusively for professional use
- found in areas where customers do not have access, such as back shops of supermarkets, groceries and butcheries, restaurants, hotels, pubs, cafés, industrial facilities and professional kitchens (e.g. schools, hospitals, canteens etc.)
- focus on compliance with hygiene rules related to food safety (HACCP)

Common designs are: vertical single-door, chest, under-counter, vertical double-door. Professional refrigerated cabinets with transparent doors are a recent but growing trend.

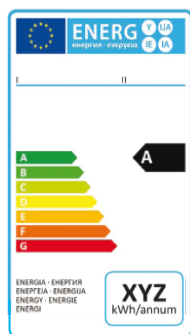


Professional refrigerated cabinets have an aggregated energy consumption of 9.5 TWh per year in the EU, with 0.4 million units sold and a total stock of more than 3 million units (2008). The data of the two government programmes confirms the great efficiency potential and the need for an energy label (energy consumption of professional refrigerators varies by more than factor 2, see graphs below).

Current event: Working documents on professional refrigerated cabinets are discussed at a **Consultation Forum on Thursday January 19th**.

3. Draft regulations for professional refrigerated cabinets

The working document contains two approaches for regulations. Option 1 sets minimum efficiency requirements and class limits directly for the *Total Energy Consumption TEC* divided by the net volume. Option 2 uses an *Energy Efficiency Index EEI* which sets the *Total Energy Consumption TEC* in relation to a *Standard Energy Consumption SEC* (linear mathematical function of the net volume).



The Energy labelling requirements envision a label with classes A to G and the indication of the annual energy consumption in kWh/year.

The Ecodesign requirements contain Minimum energy efficiency requirements (MEPS) in two stages (Tier 1 and Tier 2) and Product information requirements concerning energy consumption, efficiency and refrigerant fluid.

Timeline: January 1st 2014 (January 1st 2017 for Tier 2).

4. Topten is in favour of Option 2

The proposed *Energy Efficiency Index EEI* in Option 2 is well suited to compare products of various sizes and constructions in a fair way. Option 2 should be supported because it is more transparent and easily understood, simpler to handle, and it treats different products more fairly than Option 1.

Topten used solely Option 2 for all calculations in this recommendation paper.

5. MEPS and class limits need to be better aligned to today's market situation

In Europe there are two government programmes that maintain product lists of professional refrigerated cabinets: the Enhanced Capital Allowance scheme (UK) and the Danish Energy Saving Trust (DK). The energy consumption is measured according to official test standards (BS EN 441:1995/1996, EN441 or DS/EN ISO 23953).

Topten used this data to look into the proposal. The data contains service cabinets with one or two doors, 300 to 1300 liters, 116 refrigerators, 64 freezers. Gastro two door counters were not considered. Data as in April 2011. This data is plotted in the following graphs, together with the proposed class limits (Option 2). In Option 2, *EEI* is defined as ratio of the *Total Energy Consumption TEC* to the *Standard Energy Consumption SEC*.

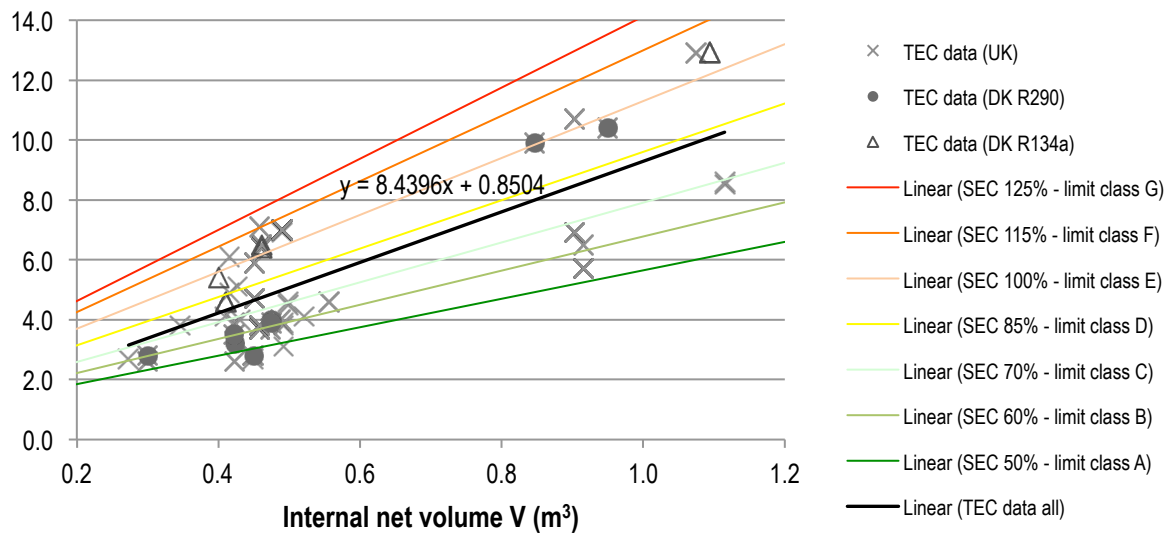
MEPS Tier 1 (January 1st 2014):

- EEI value of less than 125 (class G)
- exemption chest freezers: EEI value of less than 100 (class E)
- exemption cabinets with transparent or translucent doors: EEI value of 137.5 (**no class**)

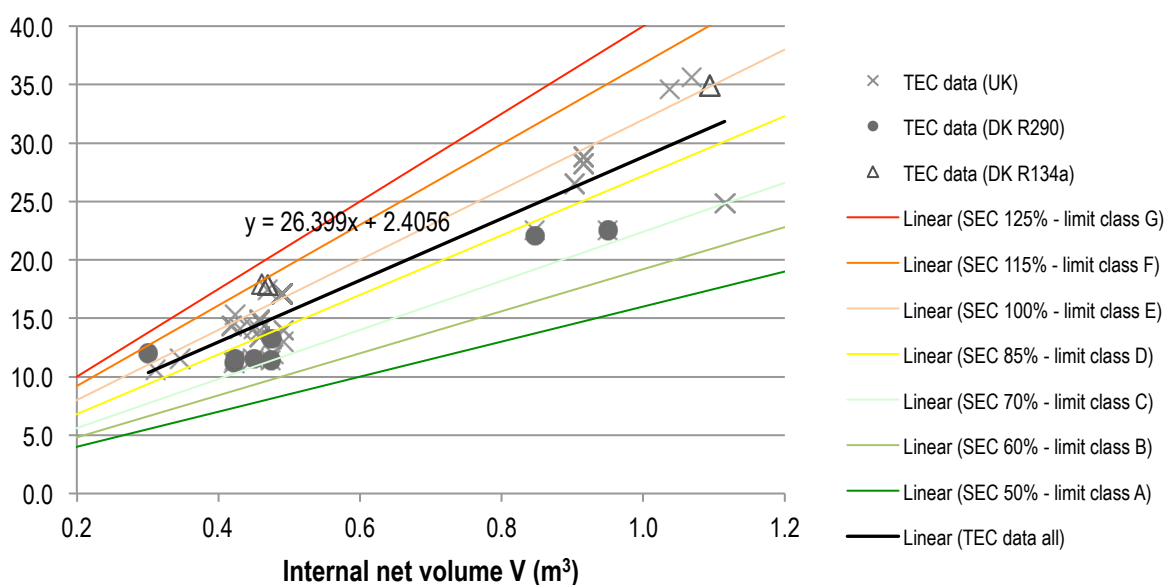
MEPS Tier 2 (January 1st 2017):

- EEI value of less than 100 (class E)
- exemption chest freezers: EEI value of less than 75 (**not identical to class limit**)
- exemption cabinets with transparent or translucent doors: EEI value of 110 (**not identical to class limit**)

Refrigerators: Total Energy Consumption (kWh/48h)



Freezers: Total Energy Consumption (kWh/48h)



Findings:

- First of all, the data confirms the **great efficiency potential and the need for an energy label** for professional refrigerated cabinets (large difference in energy consumption).
- **Cabinets with environmentally friendly refrigerants like R290 show to be more efficient** compared to cabinets with conventional refrigerants like R134a or R404A.
- **The range in energy consumption is greater for refrigerators than for freezers** (roughly by factor 2.5 vs. 1.5). The label will be more accurate if class limits are set for refrigerators and freezers separately.
- There are practically no refrigerators in class G: **Tier 1 will have no effect**, all products will stay on the market. Class G needs to be more stringent.
- There are some freezers in classes F and G: The worst-performing freezers could be banned from the market at Tier 1. Note: It is not known, which freezers in the graph are chest freezers and which are vertical cabinets. Further data analysis is needed to make a certain statement.
- There are already several refrigerators in class A: **The energy label will not reward efficiency improvements**. Class limits need to be more stringent.

6. Topten proposes more stringent class limits

Refine definition of SEC

The definitions of SEC should be aligned with the best available data on energy consumption for today's market situation. Considering the data analysed for the purpose of this recommendation paper Topten proposes the following new definitions of SEC:

For refrigerators:

$SEC = 1.44 + 7.6 \times V$ (function in draft regulation multiplied by a factor 0.8)

And for freezers:

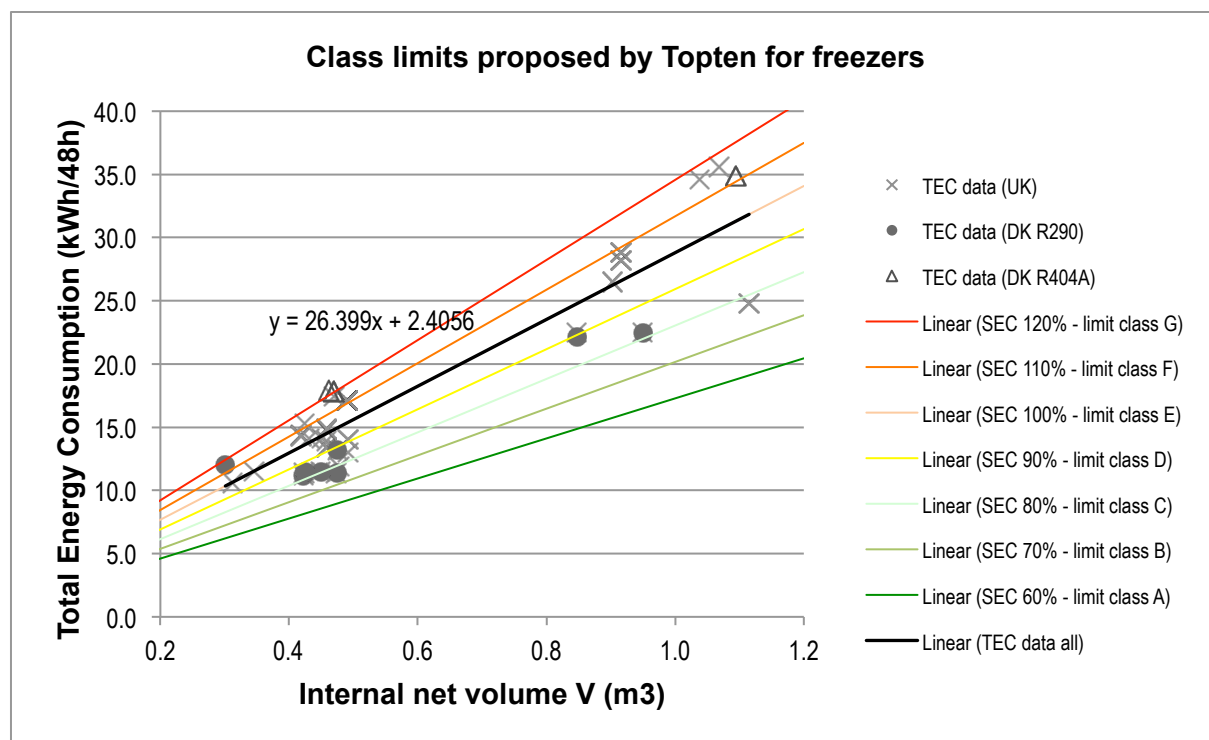
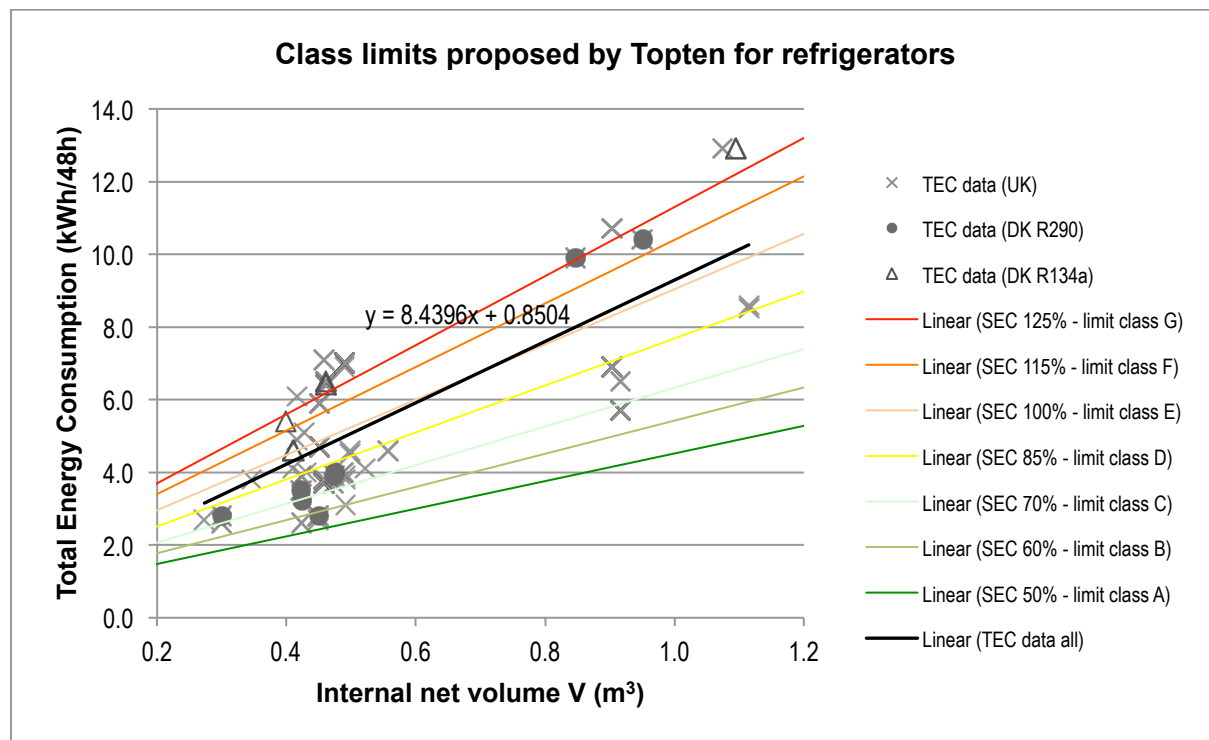
$SEC = 2.4 + 26 \times V$ (linear trendline for freezer data)

Separate class limits for refrigerators and freezers

Class limits from the draft regulation could be used for refrigerators. This is under the condition that the definitions of SEC are refined like proposed above. Topten proposes to set separate Energy efficiency index values for freezers. Possible new class limits for freezers are shown in the table below.

Energy efficiency class	Energy efficiency index value	Energy efficiency index value
	Refrigerators	Freezers
G	<125	<120
F	<115	<110
E	<100	<100
D	<85	<90
C	<70	<80
B	<60	<70
A	<50	<60

The below graphs illustrate the proposal by Topten:



MEPS should be identical to class limits

MEPS should be identical to class limits, anything else will be hard to comprehend and difficult to communicate. At this state, the working documents propose MEPS that in some cases lie in between

class limits and are obscure without explanation (Tier-1 and Tier-2). Better would be to set the MEPS at the next strictest class limit.

7. Topten proposes a ban of refrigerants with high impact on global warming

There are professional refrigerated cabinets on the market using natural refrigerants for all sizes and designs (e.g. hydrocarbons such as propane and isobutane). Cabinets with natural refrigerants also tend to be more efficient. Therefore Topten proposes to phase out refrigerants with GWP > 150 at Tier-2 in 2017.

8. Topten supports a test method that is simple and affordable

The test method for the energy label should be as simple and cost-effective as possible. It would be desirable to discard details in the test method if they lead to extraneous work for the laboratory. This would encourage market surveillance; affordability is a greater benefit than slightly more realistic values for energy consumption.

9. Topten supports verification tolerances of 5%

Verification tolerance of 5% is useful and should be supported. This is mentioned because other product groups allow 15% tolerance. This enables products to “jump” one or even two energy efficiency classes.

10. References

Government programmes:

- The Enhanced Capital Allowance scheme (UK): <http://etl.decc.gov.uk/etl>
- The Danish Energy Saving Trust (DK): <http://www.savingtrust.dk>

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

ENTR Lot 1 preparatory study on Refrigerating and Freezing Equipment:
<http://www.ecofreezercom.org>