Re/genT Note[1]:15420 / CE14 / V3	Technical Note
Project	Eco-design & Labelling Review Household Refrigeration, preparatory/review study
Subject	CECED Comments to Interim report (14.11.2015) of Eco-design & Labelling Review Household Refrigeration
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To	CECED WG Cold

1. Introduction

1.1. Document revision history

Release date	*Author*	*Version*	*Remark / document change*
28-11-2015	MJ	D1	First trial
1-12-2016	MJ	D2	Version for discussion at WG cold meeting Milan, 3/12/2015
14-01-2016	MJ	V1	Review for WG Cold meeting 19-1-2016
21-01-2016	MJ	V2	Update after WG Cold meeting 19-1-2016 • Info on load processing efficiency test added.
25-01-2016	MJ	V3	Added: • Issue of rounding • Build-in compensation for fresh food

1.2. General

The EU commission, DG Energy has ordered a review study of current eco-design requirements (regulation 643/2009) and labelling (delegated regulation 1060/2010) for cold appliances. A study team lead by VHK, the Netherlands, has presented a second interim report (dated 14-11-2015) which has been discussed in a second stakeholder meeting, held in Brussels, 14-12-2015 and is further referred to as “the report”.

This notes collects observations from CECED, based on analysis performed, two WG cold meetings and several phone conf. calls.

The comments in this note make reference to the appropriate chapter in the interim report. Comments of editorial nature or minor technical considerations are collected in the appendix.

A few important items are not discussed in this note:

[1] *The last digits refer to the version number of this note*

a) The technical analysis of chapter 9 has been discussed and studied in great detail. Comments and proposals are included in Re/genT Note :15423 / CE15 / V5.
b) The life cycle analysis of chapter 12 has been studied and commented upon in Re/genT note: Re/genT Note :15424 / CE16 / V1. This has been presented before the stakeholder meeting and its contents have been presented by the study team during this meeting. This document has not been further updated and comments are believed to be taken into account by the study team.

2. Executive summary

In general the concept of using no categories but base the analysis on compartments is welcomed. The use of compensations on energy in steady of correction factors which was proposed by CECED has been included in the study which is appreciated.

3. Chapter 3: Scope

For wine storage appliances, the new category proposed by CECED has been considered but deemed unnecessary. The reasons mentioned:

1. The products are on its basis similar to e.g. cellar appliances
2. If eco-design requirements would be set, these can easily be set at a different level than for regular appliances (e.g. different level for refrigerators (R) with only wine storage compartments.

The latter is indeed one of the manufacturers concern. The second is that if wine storage appliances are mixed with other products this limits the distribution of the energy efficiency classes for the other products[2] (today all wine storage appliances are above A+).

As a generic remark CECED supports strongly the statement that the definitions should be such that every refrigeration appliance in the scope of the regulations concerning household, commercial and professional refrigeration is unambiguously covered by one (and only one) regulation.

4. Chapter 4: Standards

A reference is included for power consumption in standby and off mode. It should be indicated that this is not relevant for cold appliances.

It is mentioned that the load processing tests has little added value. This is confirmed by CECED. The technical background (on page 31) is not completely correct as it mentions that the energy consumed is more driven by the energy released from the food and not by appliance characteristics. Actually the energy consumed is directly proportional to both the efficiency of the refrigeration system and the heat released from the food. CECED argument for not using load processing testing is based on another fact, namely that it adds little discrimination between products if the test would be included in the energy consumption declared, this at the expense of a significant increase in test time, test costs and uncertainty of the final result. In appendix 2 a slide has been added which explains that for appliances at the same energy consumption level during the regular tests, potential differences in

[2] *In a rescaled system, efficiency class G could possibly be around the current eco-design limit of A+, which would bring all current wine storage appliances into G.*

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refrigeration system efficiency contribute little to a final energy consumption declaration if the load processing efficiency test would be included. The incremental energy of load processing can much easier be compensated for by an increased ambient temperature during the test compared to actual home temperatures[3].

5. Chapter 5: Legislation

A rounding issue is present when checking efficiency classes. The legislation requires that the annual energy is rounded to two digits before calculating the energy efficiency index. The annual energy on the label is to be rounded up to the nearest integer. In a verification of the label only the rounded up value is generally available. If this is used to calculate the energy efficiency index often a value just above the efficiency class threshold is found, while the original data used by the manufacturer would result in an efficiency index just below the threshold.

If the annual energy consumption on the label would be rounded to the nearest integer (instead of only upward rounding), this problem would be avoided. However, this would generate another problem, namely that the declared value would be below the actual value used by the manufacturer, based on test results. At a consumption level of 100 kWh/y this effect becomes 0.5 % which is significant in the verification process. This could be resolved by allowing an extra 0.5 kWh/y in the tolerance of the verification process (or by adding a digit in the declared annual energy but this is less desirable).

6. Chapter 9: Technical Analysis and Metrics

The report proposes to use the specific annual electricity consumption *q* in [kWh/(dm^{3}a)] rather than the annual energy consumption (AE) today. In principle these are equivalent formulations, where *q* expresses better that the consumption of larger appliances is significantly smaller than for small appliances per litre volume.

Further the report proposes to base new reference line on a technical analysis rather than a statistical one as this is biased by existing regulations. The technical analysis contains a major point: it is assumed that larger appliances have thicker insulation. Therefore, reference lines drawn as function of volume do not compare technically equivalent products (assuming the same insulation thickness) but already include an improvement option for the larger appliances.

The report also based new reference lines on the new global standard, which is supported. The impact of the global standard to the appliance energy use has been reported earlier in Re/genT report: 15127 / CE40 / V2 “the impact of the new global standard”.

The CECED study included in the Note 15423 / CE15 / V5 follows the same approach and analyses the method in detail.

Further chapter 9 discusses compensations.

[3] *Which has been the generic approach by using 25 C as ambient temperature at the current test standard. In the new global test standard this level can be chosen and has been proposed in the report as 24 °C which corresponds to an actual test at 25 °C.*

1. Auto-defrost: For No-Frost a 20 % correction for frozen food compartments on the energy is proposed, based on the statistical analysis. This is confirmed.
2. Built-in compensation: A compensation of 4 % for fresh food and 10 % for frozen food is proposed in chapter 9, based mainly on the difference in test conditions for built-in products. This is confirmed. (Note that CECED proposed earlier new categories rather than compensation factors, however as the proposed compensations are only slightly lower than current corrections this is acceptable). Note that in the executive summary a compensation of 5 % is reported for the fresh food.
3. Chill: The study does not propose any compensation. It is stated that the equivalent volume calculation (r_c) should give enough compensation. Its value is given as 1.25 however, with the new global standard this will reduce to (24-2)/20 = 1.1 as the target temperature has increased to +2 C. CECED has presented during the stakeholder meeting that definitely a compensation is needed for such compartment as it results in environmental savings not expressed in the energy tests of refrigerators. This is further worked out in a Re/genT note: 16104 / CE17 / V2.
4. Multi-compartment: For reasons of additional consumer benefits in food preservations (and storing foods at higher temperature than today). The proposed compensations are 2, 3.5 and 5 % for 3, 4 and > 4 doors respectively. This is slightly lower than CECED proposal of 3, 5 and 6%.
5. Wine storage: The study mentions that there are no apparent reasons for a different reference line. This ignores the fact that wine storage appliances (especially those with a glass door) have a much higher consumption than the A+ level today. This limits the possible distribution of energy efficiency classes (or it results in a large part of the wine storage appliances in G). As the study proposes a compartment concept rather than categories, it is indeed difficult to treat wine storage appliances differently. If eco-design limits would be set for these products, compensation is definitely required for glass doors of a value of at least the 20 % presented in the study.

Appendix 1: smaller issues

Here a list of smaller issues found are included, varying from technical observations to typo's.

Chapter	Page	Comment
Ex. summary	11	The calculation of consumer expenditure per product does not seem to be OK. The energy bill of 17.1 billion Euro is divided by the annual production, while it should be the fleet (303 million) resulting in 56.4 EUR/unit rather than 878 EUR/unit
3.1	17	The text "technically the AC/DC converter will usually come into play if an electric mains-(AC) operated appliance can also be battery operated" should be rephrased as: "technically the AC/DC converter will usually come into play if a battery operated appliance needs to be electric mains-(AC) operated"
4.1	26	The measurement method for wine storage appliances is mentioned to be included in the communication, Part 2. This reference is unclear (if it is referring to the transitional method communicated by the commission, it should also refer to the new harmonized standard EN62552:2013 where wine storage

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		appliances are included).
4.2.2	29	• Add to storage tests that these are carried out with test packages. • For freezing and cooling capacity tests the word M-packages after ballast load should be eliminated (the ballast load contains normal packages and M-packages) • It is mentioned that the temperature rise test is not included in the current regulation. However, it is included as part of the information requirements.
4.2.3	30	It is mentioned that currently "a few simple 24 h tests are no longer sufficient". This is an underestimation of current praxis. Only for refrigerators without frozen food compartments, this may be the case, but for any other product, utmost care must be taken to stability (requiring at least two 24 h tests for comparison) or for proper registration of defrosts (which can prolong the test time to 72 hours or more, plus stabilization time needed before this test time).
4.3	32	The following text "Similarly, to reach an average .., within a restricted time period, costs less energy than reaching..", suggest that this is about a dynamic process. However, this is not the case, suggested replacement: "Similarly, to maintain an average .., ~~within a restricted time period~~, costs less energy than maintaining…"
4.3	35	0-0.5 % less energy for freezers (category 8-9) is not according the CECED report where it is listed as 2 % (see Re/genT report Report_15127_CE40_V2)
9.1.2	83	V_{eq} is presented as a non-dimensional number, which is confusing. Propose to replace it with r_{eq} as it weighs the r_c factor for different compartments.
9.3.3	93	"Only Embraco gives performance data over a large set to …" There are more manufacturers giving the data over a range (e.g. Secop).
9.3.4	99	It is mentioned that using ""waste heat" to defrost the evaporator may not show up in the new IEC standard. Actually, it does show up, e.g. if the evaporator is defrosted with refrigerator air only (needs closing of freezer section which is not common), then the new standard will show an incremental energy consumption for a defrost of practically zero.

Appendix 2: load processing efficiency

RE GENT 2

Introduction

- The normal energy consumption of a cold appliance is influenced by:
  - The quality of the insulation (the actual heat load)
  - The efficiency of the refrigeration system
- New global test standard (IEC62552-3) introduces a load processing efficiency test (not obligatory):
  - Measures separately refrigeration system efficiency by introducing warm loads to fresh food and/or freezer compartments
  - Using a standard load quantity the incremental energy used per year by the fridge for cooling down or freezing the load is calculated
- High efficient products generally have both high insulation quality and high refrigeration system efficiency
- Calculation example to understand the possible impact.

RE GENT 3

Calculation

Insulation:	Good	Bad
Refrigeration System:	Bad	Good

- Example with combi having the same consumption in the normal energy consumption test
- Worst case example assumed here: 20 % difference in load processing efficiency

Example calculation	X		Y
Energy consumption [kWh/y], interpolated between 16 and 32 C test	250	Same	250
Load Processing Efficiency	1	20 %	1.2
ΔE processing [kWh/y]	36		30
Total consumption [kWh/y]	286	Only 2%	280

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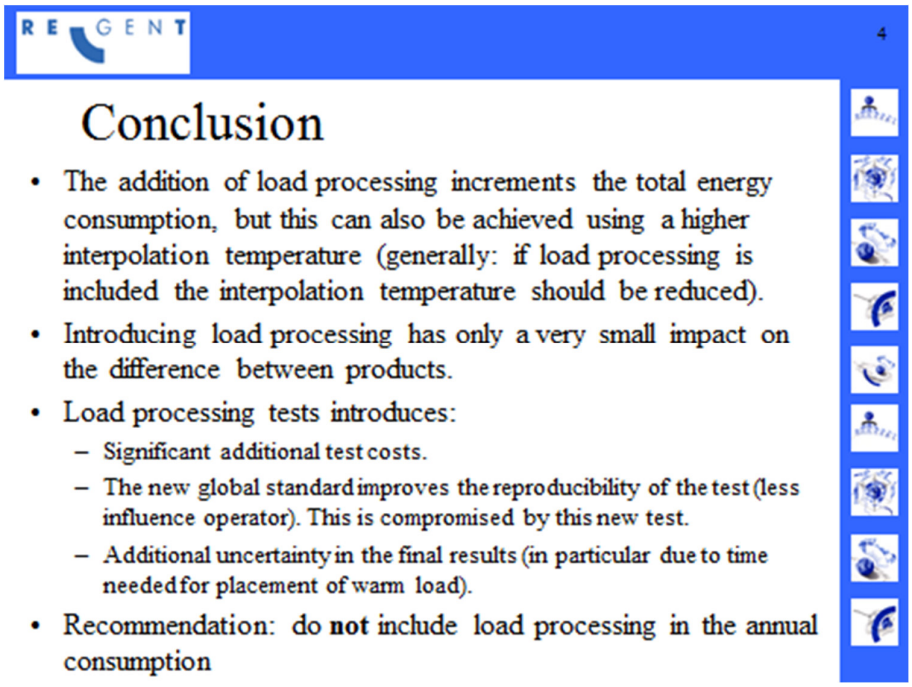

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