



D5.4: Analysis and overview of laboratory reports.

WP5: Product competition for most efficient professional cold models on the European market

Task 5.2 & Task 5.3

Christof Horvath, Austrian Energy Agency, Austria

Final version, 16 March 2017

Project Partners



This ProCold project has received funding from the *European Union's Horizon 2020 research and innovation programme* under grant agreement No 649293.



The sole responsibility for the content of this report lies with the authors. It does not necessarily reflect the opinion of the European Union. Neither the EASME nor the European Commission are responsible for any use that may be made of the information contained therein.



Co-funded by the Intelligent Energy Europe Programme of the European Union



Content

1. Introduction.....	3
From Grant Agreement.....	3
Goal.....	3
2. Product competition.....	3
Summary	3
Product categories and testing standards	4
Laboratory selection.....	6
Testing implementation	6
Winning products	7



Co-funded by the Intelligent Energy Europe Programme of the European Union



1. Introduction

From Grant Agreement

Task n.5.2.: Product testing for compliance verification.

Following the submission of specific models for the competition, the project team will select about 10 – 20 models (targeting the winning models, depending on the amount of submissions for the competition), which will be tested for comparing their performance claims in standardised laboratory conditions. This testing procedure will ensure that products being highlighted by the project and its dissemination tools will deserve such recognition, as it will be supported by an independent verification.

Laboratory used for testing will be selected by a project tender on a best value for money principle, guaranteeing high quality and transparency of testing, respecting full requirements of the Standards, and delivering appropriate test reports.

The main purpose of the testing will be to a) to validate manufacturer's declarations, b) to include these (conform) models in the competition, c) select and test additional models which should receive such recognition (the model is considered to be the best available technology), but the manufacturers would not submit sufficient documentation.

Task n.5.3.: And the winner is...

The models fulfilling technical criteria required, for which the appropriate documentation has been submitted, and/or for which the test procedures have been fulfilled, will be rewarded within the respective subcategories of the competition.

The winning models will be rewarded a specific logo of the competition, individual communication and product recognition will be communicated with the respective manufacturers, but also other stakeholders using such products, and the media (see WP6). The competition results will be analysed in terms of the energy performance differences between the average and the best performing products and these results will also be made available to public authorities, responsible for energy efficiency policies and legislation, in order to provide information on market development and energy efficiency potential within the individual product subcategories.

Goal

Providing an overview of the winning Products of the ProCold product competition.

2. Product competition

Summary

Submissions for the product competition were received in all of the following categories by September 31st 2016:

- Vertical chilled storage cabinets
- Beverage coolers
- Small ice cream freezers



Co-funded by the Intelligent Energy Europe Programme of the European Union



- Vertical supermarket refrigerator cabinets
- Refrigerated glass fronted vending machines

Based on submission info and reported energy performance, the most efficient appliance in each category was selected for additional independent testing. In categories in which two appliances had similar reported energy performance two independent tests were performed (this was the case in the vertical chilled storage cabinet category). In cases, in which testing failed (one case in the vertical supermarket refrigerator category), the appliance with second best performance was additionally tested.

In two categories (beverage coolers and ice cream freezers) an additional appliance each was tested, which were not officially submitted to the competition but for which the ProCold consortium expected high efficiency. These were not officially part of the competition (as they were not formally submitted) but were tested to gain a better understanding of market development and top performing products in these categories.

A winner was selected in each category based on confirmed energy performance through independent testing and winners awarded at the international EuroShop fair on 7 March 2017 in Düsseldorf, Germany.

Product categories and testing standards

For the different product categories more specific sub-categories were defined for the competition to allow for a fair comparison of energy performance. Also testing standards and conditions were defined based as much as possible on existing and planned Ecodesign regulations for the categories. As regulations for commercial display cabinets are not yet finalised and such products formed a core part of the completion these test conditions were based on the latest publicly available draft of the regulation, which contains proposals for EEI calculations. Also latest draft versions of test standards were used as the basis for performance testing.

Specifically, the following category definitions and test standards were applied:

i. Vertical chilled storage cabinets

- As defined in Ecodesign Regulation (EU) 2015/1095 of 5 May 2015
- 1-door, 400-700 litres net volume calculated according to EN 16825:2016 (approved)
- Refrigerant with global warming potential (GWP) below 150 (e.g. R290, R600a, CO₂)
- Temperature class M1 according to EN 16825:2016 (approved) (-1°C to +5°C)
- Energy efficiency index (EEI) determined at 30°C/55% RH based on measurements according to EN 16825:2016 (approved) and EEI calculation according to Ecodesign Regulation (EU) 2015/1095

ii. Beverage coolers

- As defined in the (draft) European Ecodesign Regulation for refrigerated commercial display cabinets available on 31 August 2016 (and provided on topten.eu/pro-cold)
- 250 – 550 litres net volume calculated according to FprEN 16902 (under approval), vertical cabinet with one transparent door
- Refrigerant with global warming potential (GWP) below 150 (e.g. R290, R600a, CO₂)
- Temperature class K1 according to FprEN 16902 (under approval) (0°C to +7°C, $\delta \leq +3.5^\circ\text{C}$)
- Energy efficiency index (EEI) determined at 25°C/60% RH based on measurements according to FprEN 16902 (under approval) and EEI calculation according to applicable (draft) European Ecodesign Regulation

iii. Small ice cream freezers

- As defined in the (draft) European Ecodesign Regulation for refrigerated commercial display cabinets available on 31 August 2016 (and provided on topten.eu/pro-cold)
- 150 – 500 litres net volume calculated according to FprEN 16901 (under approval), with transparent lids
- Refrigerant with global warming potential (GWP) below 150 (e.g. R290, R600a, CO₂)
- Temperature class C1 according to FprEN 16901 (under approval) (-18°C)
- Energy efficiency index (EEI) determined at 30°C/55% RH based on measurements according to FprEN 16901 (under approval) and EEI calculation according to applicable (draft) European Ecodesign Regulation

iv. Vertical supermarket refrigerator cabinets

- As defined in the (draft) European Ecodesign Regulation for refrigerated commercial display cabinets available on 31 August 2016 (and provided on topten.eu/pro-cold)
- Total display area (TDA) between 0.5 and 3 m² calculated according to EN ISO 23953-2:2015
- Refrigerant with global warming potential (GWP) below 150 (e.g. R290, R600a, CO₂)
- Temperature class M1 (-1°C to + 5°C) according to EN ISO 23953:2015

- Energy efficiency index (EEI) determined at 25°C/60% RH based on measurements according to EN ISO 23953-2:2015 and EEI calculation according to applicable (draft) European Ecodesign Regulation

v. Refrigerated glass fronted vending machines

- As defined in the (draft) European Ecodesign Regulation for refrigerated commercial display cabinets available on 31 August 2016 (and provided on topten.eu/pro-cold)
- Category 2 “Refrigerated glass fronted can and bottle, confectionery & snack machines” according to EN 50597:2015
- Refrigerant with global warming potential (GWP) below 150 (e.g. R290, R600a, CO₂)
- Temperature class according to Category 2 machine type (12°C)
- Energy efficiency index (EEI) determined at 25°C/60%* RH based on measurements according to EN 50597:2015 and EEI calculation according to applicable (draft) European Ecodesign Regulation

* EN 50597:2015 will be revised soon to better align with other standards and to be in alignment with the Ecodesign requirements. One planned change is with regard to the ambient test room conditions. In the upcoming revision of the norm these are expected to be fixed at 25 ± 2°C/60 ± 5% RH. These expected conditions shall apply for measurements for the product competition.

Laboratory selection

Two laboratories were selected on a best value for money principle for testing of appliances in all categories. The tests were performed by Re/gent laboratory in the Netherlands and DTI in Denmark. A detailed description of laboratory selection is contained in an Annex to this document.

Testing implementation

In each category the – per manufacturer declaration – most efficient product was subjected to independent testing to confirm these declarations. In categories with competition entries of similar energy performance these were tested in parallel to identify a definitive winning product.

Vertical storage cabinets

Two appliances with similar energy performance were tested. One of these appliances did not meet the performance requirements and was taken out of the competition. Energy performance of the other appliance was confirmed through the independent test.



Co-funded by the Intelligent Energy Europe Programme of the European Union



Beverage coolers

One appliance was tested and the test confirmed the manufacturer declaration. The ProCold consortium decided to perform an additional test of an appliance not submitted to the competition but with according to Topten lists very good energy performance. It had a significantly lower energy performance (higher EEI) than the submitted product to the competition, demonstrating the possibility for significant improvements in energy performance in the category.

Small ice cream freezers

One appliance was tested and the test confirmed the manufacturer declaration. The ProCold consortium decided to perform an additional test of an appliance not submitted to the competition but with according to Topten lists very good energy performance. It had a better slightly better energy performance (lower EEI) than the submitted product to the competition (within tolerance margins).

Vertical supermarket refrigerator cabinets

One appliance was tested initially. However, it did not meet minimum performance requirements (could not keep temperatures during door opening sequences), also after a second test in a different laboratory. Hence, the manufacturer of the second best appliance based on initial ranking was invited to have their appliance independently tested. This test confirmed reported energy performance.

Refrigerated glass fronted vending machines

One appliance was tested and the test confirmed the manufacturer declaration.

Winning products

For the following five products the manufacturer's declaration was confirmed by the test laboratory. The winners were announced during the international EuroShop fair in Dusseldorf on March 7th 2017 and the manufacturers received the official ProCold award.

Vertical storage cabinets

The winning model of this category is the **Gram Superior Plus K 72 G**. With an energy consumption of 285 kWh/year and a volume of 462 litres, this refrigerator reaches an energy efficiency index of 20,8. Compared to a inefficient product with an Energy Efficiency class of G, this class A refrigerator uses 4-5 times less energy.

Beverage coolers

The winning model of this category is the **Liebherr FKDPv 4503**. This beverage cooler consumes a yearly amount of 449 kWh, which is way below the energy consumption of an inefficient beverage cooler, ranging around 2.600 kWh/year.

Small ice cream freezers



Co-funded by the Intelligent Energy Europe Programme of the European Union



The winning model of this category is the **Liebherr GTEP 3302**. The product consumes 589 kWh per year. In comparison, an inefficient ice cream freezer consumes four times more energy per year.

Vertical supermarket refrigerator cabinets

The winning model of this category is the **Carrier Optimer 0948LG R290**. The Carrier Optimer 0948LG R290 consumes 3.030 kWh per year which is 10.000 kWh less than an inefficient model.

Refrigerated glass fronted vending machines

The winning model of this category is the **Sielaff GF Robimat XM**. This glass-fronted vending machine shows a measured yearly energy consumption of 1.628 kWh.