Eurovent chiller certification key stones and future challenges

In 1995 Eurovent launched the first European chiller certification program with the announced goals to provide a common playing field to manufacturer, promote energy efficiency and educate end user. The continuous effort of the industry and independent laboratories helped over the years to shape a strong well recognize program and to lead the way for upcoming legislation.

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Energy Labeling since 2005

Eurovent chiller program introduced the first energy label for chiller based on energy efficiency restricted until that moment to household appliances in the regulation. The classification scheme follows the A to G approach used in the European Energy Labeling regulations for household appliances while the class's thresholds were defined and revised by the participants to promote energy efficient products, phase out non- efficient products and incentivize development.

Development of a European Seasonal Energy Efficiency Ratio

The seasonal efficiency ratio presents another effort from Eurovent and the chiller certification program participant's to provide simple and representative selection criteria to help the purchaser choose more efficient products. Efficiency at standard conditions and energy labeling are great tools to select efficient products but they only reflect the efficiency of the product under standard conditions at full load which is practically insignificant over the real operating conditions of the product. The European Seasonal Energy Efficiency Ratio (ESEER) is a weighed formula enabling to take into account the variation of EER (Energy Efficiency Ratio) with the load rate and the variation of air or water inlet condenser temperature as follows

$$ESEER = A \times EER_A + B \times EER_B + C \times EER_C + D \times EER_D$$

Where

Conditions	Load Ratio %	Weighing coefficient	Air temperature at condenser inlet (air cooled chillers)	Water temperature at condenser inlet (water cooled chillers)
A	100	0.03	35	30
B	75	0.33	30	26
C	50	0.41	25	22
D	25	0.23	20	18

Although the ESEER methodology is inspired by ARI IPLV[**1**], the conditions and the weighing coefficient were determined after a study for European climate and European buildings.

As shown in **Figure 1** the discrepancy between Energy Efficiency ratio at nominal condition and the ESEER, and the fact those units with the similar EER have different values of ESEER summarize the added value of this approach. The ESEER should be the primary criteria to select a unit with better performances at operating temperature conditions and part load.

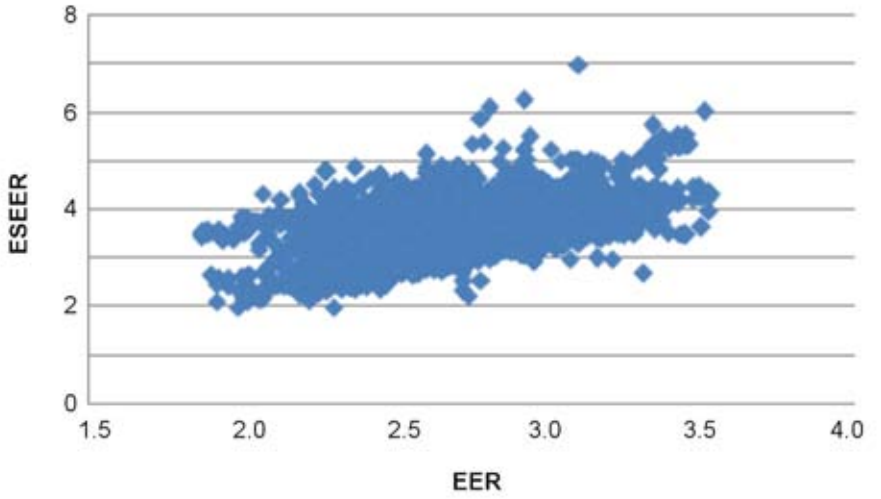

Figure 1. ESEER vs. EER Eurovent 2012 certified data for air cooled chillers

The ESEER is largely embraced by the market and become recognized as a major selection criterion. The ESEER certification also constituted experience that helped during the study for Ecodesign[**2**] regulation Lot 6 especially for determination of minimum energy efficiency requirement and possible threshold for labeling.

Energy use of pumps and fans impact on chiller performances

A revision of EN14511 was ratified on the 19th of July 2011 and published beginning of 2012. The new version of EN 14511-2011 advocates that the efficiency of the pump whether it is an integral part of the unit or not is a function of its hydraulic power instead of the default value.

Historically chiller performances were certified as "gross" values measured when the pump is not running for units with integral pumps. This choice was made as the previous methodology (using a default value) was unrealistic and penalizing especially large units.

As this method is more realistic, the chillers program participants decided to fully apply this new version starting from the 2012 certification campaign. The new performances declared based on this new version of the standard were published on the ECC website by March 2012.

As shown in **Figure 2** a significant difference between thermal performances (Cooling/Heating capacities, EER/COP and ESEER) published according to EN 14511:3-2011 and those certified during the previous campaigns (calculated according to EN 14511:3-2007 with exception of heat exchanger pressure drop & water pump efficiency) can be observed.

Eurovent also advocates for the adoption of the same mythology for Fan's as minimum efficiency are already defined in the regulation 327 for lot 11. This approach will guarantee harmonization between the different EupLots[**3**] and to have a better transcription of the real performance of the unit.

Ecodesign

Under Ecodesign Directive chillers are affected by 3 studies which are Lot 1 Boilers and combiboilers, ENTR Lot 1 Refrigerating and freezing equipment and ENTR[**4**] Lot 6 Air-conditioning and ventilation systems. The Eurovent product group for chillers heavily participated in the work done for these lots through position papers, meeting with the consultants in charge of the preparatory study and participation in the stakeholders meeting. Eurovent help bringing accurate data and information about the state of the art of chiller industries and the forecasted technological developments in this field. The work done by Eurovent certification on the development of a seasonal energy efficiency ratio in cooling and later on in heating (ESCOP[**5**] project) helped pinpoint the dif-

1 ARI IPLV" : Integrated Part Load Value by AHRI [reference : AHRI Standard 550/590 (I-P), see http://www.ahrinet.org/App_Content/ahri/files/standards%20pdfs/AHRI%20standards%20pdfs/AHRI%20Standard%20550-590%20%28I-P%29-2011.pdf]

2 Directive 2009/125/EC of the European Parliament and of the Council of 21 October 2009 establishing a framework for the setting of ecodesign requirements for energy-related products (recast).

3 "Eup Lots": Lots for "Energy using Products directive", previous name of "Energy related Products directive" [reference : http://ec.europa.eu/energy/efficiency/studies/ecodesign_en.htm] where scope has been splitted per families of products, grouped in so called Lots.

4 Directorate-General for Enterprise and Industry at the European Commission.

5 "ESCOP": European Seasonal Coefficient of Performance.

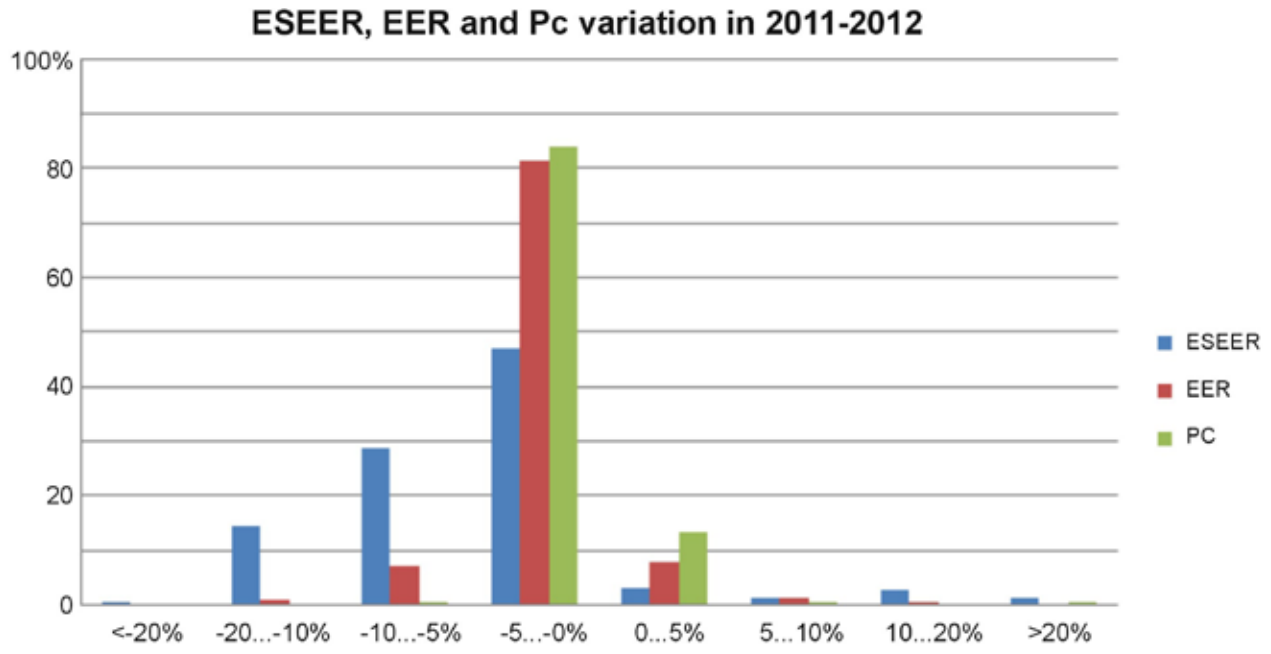

Figure 2. Distribution of the difference between 2012 net data and 2011 gross data in percentage (in horizontal axis). ESEER = European Seasonal Energy Efficiency Ration, EER =Energy Efficiency Ratio, Pc = Cooling.

ferent challenges for the instituting such factors. The certification committee for chiller also started working by creating a technical committee in order to tackle the different issue for starting the certification of performances required by the regulation that will emerge from the lots sited above.

Data publication

Making the certified data easy available for consumer and consultant was always a priority for Eurovent. Our interactive web site, created since the launching of the company helps bring reliable data. In addition to the certified data a dedicated description page for each certification program containing the outlet of the program, definitions and rating conditions is made accessible and constantly updated to help visitors understand the value and the consistency of the certified data.

In 2009 Eurovent launched a widget called Certiflash designed as a service bringing added value to the community of consultants, design engineers, specifiers, architects, buyers, contractors, developers looking for quick and real-time access to HVAC products data and to get individual certificate for HVAC products.

Available on the three popular web browsers and on iPhone, Blackberry and Android mobile phones, Certiflash is the guarantee to have a permanent access to certified data and to generate individual certificate that can be used to complete applications for local incentive scheme or to obtain a building energy performance rating.

Eurovent is also part of a project called CLE@[**6**] that aims to feed on a regular basis numerous building thermal/energy simulation software. By doing so, Eurovent certified products and associated performance data are imbedded and directly used in building calculation engines which is very helpful to consultant at the stage of product selection. This project comes as a response for the implementation of EPBD directive in different EU countries (RT 2012 in France) that requires the declaration of an important amount of performances.

The article was originally written by Ahmed Fatteh, Project Engineer at Eurovent Certification

6 "CLE@": Association managing databases (issued from Promodul and Edibatec associations): [ref: http://www.promodul.fr/sites/default/files/Juin_2012-Lettre%20Information%20CLEA.pdf]