Contribution of the Eurovent Performance Certification programs into providing incentive to manufacturers to improve the energy efficiency of HVACR products

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SUMMARY

The Eurovent Certification company was established in 1994 and administers industry driven certification programs consisting of verification testing in a network of independent test laboratories of efficiency and capacity ratings of HVACR products against published data in manufacturer's sales catalogues.

A Certified Products Directory is available to consultants, architects and equipment specifiers for evaluation and selection of equipment, providing assurance that the products will perform as indicated in the directory.

Nowadays, nine groups of air-conditioning and refrigeration related products, are verification tested and the latest list of participating manufacturers, has grown impressively to more than 180 manufacturers.

As energy efficiency became one of the most important issues for the HVACR industry, the future trend for the Eurovent Certification Programs is to evolve from the original set-up of providing a fair competition level ground for manufacturers and increasing customer's confidence towards an additional instrument of providing incentive for manufacturers to improve the energy efficiency ratio of HVACR products.

This paper will shed a light on the certification programs and how the future trends in Eurovent Products Certification ,with regard to Energy Efficiency, are dealt with.

INTRODUCTION

Eurovent is the European Committee of Air Handling and Refrigeration Equipment Industries. The Committee was established in 1959 and has amongst its members 15 national associations active in the field of HVACR industry.

List of member associations in Eurovent:

Country	National Association	National Association
Belgium	AGORIA	
Denmark	DANSK Ventilation	
France	UNICLIMA	
Germany	FV Alt im VDMA	
Italy	ANIMA	CO.AER
Finland	FAMBSI	
Netherlands	FKL	
Norway	NVEF	
Slovenia	HVAC Cluster	
Spain	AFEC	ANEFRYC
Sweden	KTG	SWEDVENT
Turkey	ISKID	

The Committee represents more than 800 companies , mainly in the manufacturing industry and producing various products to be applied in Air Conditioning, Refrigeration, Air Handling and Ventilation as well as auxiliary refrigeration and air distribution component manufacturers. The estimated turnover of the companies is in excess of 20 billion €.

The essential activity is organised through working groups where manufacturers of a particular type of products meet together, examine relevant issues and decide actions to undertake. Working groups for fans, liquid chilling packages, air conditioners, fan coil units, air handling units, air filters, refrigerated display cabinets are particularly active having usually several meetings a year. A number of application documents, guides, recommendations and other agreements have been finalised and published.

A very important feature of Eurovent organisation is the existence of the certification programmes. Eurovent Certification Company was established in 1994 on a voluntary basis by the manufacturers of HVACR equipment. The performance characteristics of HVACR products are checked by at random sampling testing of products and equipment in independent laboratories. Eurovent certification covers a large part of relevant products and more than 180 manufacturers participate in one or more programmes. Checking data claimed in catalogues is extremely important as it was shown by testing in independent laboratories that there are always actors on the market not respecting clarity and honesty in data presentation. For instance a decision on minimum efficiency for particular equipment if not supported by certification will not be applied by all manufacturers and distributors. Only regular checking by an organised system will guarantee the performance of the application.

As all products in the scope of Eurovent consume energy – mainly in the form of electricity, the energy efficiency – intrinsic to the products but also related to use and installation – has become one of the most important issues for our industry. The implementation of the Kyoto protocol has now a high priority for the European Union and strong measures shall be applied to achieve its targets fixed for Europe as a reduction of 8 % of equivalent CO_2 emission in period 2008 – 2012.

In almost all Eurovent working groups the issue of energy efficiency has been discussed during the last several years. There is a general agreement that industry must be proactive and propose relevant actions in advance, before some mandatory measures are being decided by

the European Commission or National Authorities. That would be the best way to help the industry to meet this important challenge.

EUROVENT CERTIFICATION – INCREASING INTEGRITY [1]

Eurovent Certification administers and promotes the Product performance and energy efficiency certification by means of Certification Programmes.

Existing Certification Programmes:

Air Conditioners up to 12kW cooling capacity
Air Conditioners from 12kW to 45kW cooling capacity
Air Conditioners from 45kW to 100kW cooling capacity
Close control Air Conditioners for computer rooms
Fan Coil units
Liquid Chilling Packages up to 750kW
Air Coolers for Refrigeration
Air Cooled refrigerant Condensers
Dry Coolers
Cooling Towers
Cooling and Heating Coils
Air Handling Units
Refrigerated Display Cabinets
Air to Air Plate and Rotary Heat Exchangers
Filters
Chilled Beams

Eurovent Certification maintains and publishes an updated list of certified Products in the Certified Products Directory and on the Eurovent Certification Website (www.eurovent-certification.com).

The system of Product Certification started in 1994 on a voluntary basis . The performance characteristics of HVACR products is checked by at random sampling testing of products and equipment in independent laboratories.
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The total number of participating companies today amounts to 185 companies.

Major issues besides the data checks of actual products versus the published data in sales and promotion catalogues are the Energy labelling implementation beyond what is provided for in the existing European directive (for air conditioners with a cooling capacity up to 12kw) and the determination of minimum energy efficiency levels below which certain products are not eligible to carry the logo “Eurovent Certified Performance”.

A Certification Manual defines the organisation and general rules of Eurovent Certification and gives principles to follow in each programme. It must be emphasised that the Manual is regularly updated in order to keep the integrity at the highest possible level.

EUROVENT CERTIFICATION

General Principles

The following general principles are used in all certification programmes. The staff of the Certification Company must check their application and inform the Compliance Programme and Policy Committee (CPPC)of any deviation.

- Eurovent Certification Programmes are open to all manufacturers of relevant products – European and non-European - without any discrimination.
- Eurovent Certification is intended for European market and only products that could be sold in Europe* may be certified.
- Products produced by European or non-European manufacturers for other markets and which could not be sold in Europe (for instance 60 Hz units, non-authorised refrigerants etc.) could not be certified.
- Products which could be sold in Europe but are intended for other markets must comply with specific rules applied in Europe (for instance refrigerants, energy labelling for air conditioners and minimum efficiency).
- Conformity with safety directives (LVD, EMC, MD, PED) shall not be part of certification but will be required if applicable. However independent laboratories shall be asked to inform participants and Eurovent on possible irregularity .If non-conformity is confirmed the certification shall not be granted.

  *Europe represents members of European Union, and associated countries.

EUROVENT CERTIFICATION

Certify-All

The scope of each certification programme is clearly defined. Only products that may be tested by an independent laboratory either inside the laboratory or at participants' facilities shall be included. If for some large equipment there is no available laboratory above some defined size, the scope shall be limited to smaller units.
For some products like Air Handling Units the selection software is certified and the smallest size of the range must be such that the testing in an independent laboratory is possible.

All products of the relevant certification programme manufactured or sold by a participant inside the defined scope must be certified. When applicable, "certify-all" procedure means at least "all products inside the defined scope presented on the European market", but each Compliance Committee may implement larger applications.

"Certify-all" brings clarity and transparency and therefore increases the value of the whole system. If for some products due to their nature it is difficult to define a scope satisfying all participants the approval of the CPPC must be asked.

EUROVENT CERTIFICATION

Independent Laboratories

For each certification programme only one independent laboratory shall be preferably selected. The laboratory must be independent with no connection to any participant in the programme. Accreditation in accordance with the EN 45001 shall be requested. If for some certified characteristics this accreditation is missing, Eurovent staff shall organise the verification of technical competence of the concerned laboratory by a competent expert. An audit following the procedures given in ISO 17025 shall be performed.

The independent laboratory shall be regularly inspected by the technical staff of the Certification Company, following a schedule decided by the Compliance Committee.

If more than one laboratory is selected for a same type of products, the regular comparison testing shall be organised in order to assure that all laboratories provide similar results. The Compliance Committee may modify selection of laboratories if necessary.

List of Independent Laboratories involved in the performance testing:

TEST LABORATORY	CITY	COUNTRY
CEIS	Madrid	SPAIN
CETIAT	Lyon	FRANCE
DMT	Essen	GERMANY
HTA	Luzern	SWITZERLAND
IMQ	Amaro/Milano	ITALY
SP	Boras	SWEDEN
TUV	Essen/Munich	GERMANY
VTT	Espoo	FINLAND
WSPLab	Stuttgart	GERMANY

EUROVENT WORKING GROUPS ACTIVITIES ON ENERGY EFFICIENCY

WG 6B "Air Conditioners" [2]

The WG 6B "Air Conditioners" has been directly involved in the SAVE project EERAC concerning energy efficiency of room air conditioners. This project was finalised at the end of 1999. Using the data provided by manufacturers and available from Eurovent Directory of Certified Products, it has been observed that energy efficiency of air conditioners presented on the market varies widely: the best units have sometimes two times higher efficiency than the worst.

Two possible policies have been analysed in detail: energy labelling and minimum efficiency.

Energy Labelling as applied with success to many home appliances like domestic refrigerators was an obvious measure. However the labelling itself means only a clear information to buyers – it is expected that buyers will prefer better equipment and that in this way the global,

average efficiency of the products sold on the market will increase. Labelling Directive for small Air Conditioners has been prepared by the European Commission and was published in April 2002. The WG 6B took a very active part examining drafts, proposing modifications and clarifications to the Labelling Directive.

Mandatory minimum efficiency has been introduced in many countries outside of Europe. This is the simplest way to eliminate low efficiency products from the market but it has a very important effect on the industry and must be applied carefully. In order to avoid such regulation the WG 6B has prepared a proposal on voluntary minimum efficiency to be supported by Eurovent certification. After many discussions the proposal received overwhelming approval from individual manufacturers and national associations.

The first practical action was applied on 1 January 2004 when air conditioners under 12 kW cooling capacity having the lowest classification (class G) were eliminated from the certification programme and, as the certify-all procedure must be applied, from the market. The effect of these measures can be seen on following table .Units with lowest efficiency (Class G) were eliminated and the minimum value is now 2.21. Manufacturers are presenting units with higher efficiency and the average energy efficiency of all air conditioners is increasing.

	EER (min)	EER (max)	EER (mean)	N0. of Units
2001	1.64	3.63	2.55	2597
2002	1.76	3.97	2.55	3251
2003	1.75	3.85	2.58	3078
2004	2.20	4.55	2.68	2081
2005	2.21	4.64	2.87	3502
2006	2.21	5.51	2.88	2396

The next step to eliminate classes F and E has been scheduled to be implemented in 2008. A proposal in connection with the Energy using Product Directive has been prepared by the WG6B in June 2005.

WG 6A "Chillers" [3]

The WG 6A "Chillers" has been examining the energy efficiency issues for liquid chilling packages – involved products cover capacity range from few kW to several MW. Several possible actions have been examined. In the certification programme, it was already decided that the energy efficiency (EER and COP) replace the power input as the certified characteristics. A voluntary classification system has been implemented although for such large equipment no physical labels will be fixed. However product classes will increase awareness of users that the energy efficiency is an important issue but also the manufacturers when they design new equipment. With a classification it may be easier to eliminate, like for air conditioners, the low efficiency products. The effect on the market has already been identified as some users simplify their request asking Class A products.

The use of chillers and the real annual energy consumption has been largely discussed. As the part load efficiency has a very strong impact on consumption, in the SAVE study EECCAC – (Energy Efficiency and Certification of Central Air Conditioners) - this issue has been treated

exhaustively. This study was initiated by Eurovent/Cecomaf and manufacturers are actively participating. An integrated energy efficiency index called ESEER (European Seasonal Energy Efficiency Ratio) similar to IPLV (Integrated Part Load Value) developed in the USA and used by ARI, was established for the European conditions. The study was finalised in 2004 and experimental application started in 2005. Part load certification was implemented in the Eurovent certification in 2006.

From the certified part load table, Eurovent will compute ESEER allowing the comparison of chillers performances in the cooling mode. This global single figure shall be published in Eurovent directory together with cooling capacity and power input for standard conditions at full load. At present, the Energy Labelling Directive is restricted to household appliances. Indeed, the label is mandatory only for Room Air Conditioners with capacity equal to or lower than 12 kW. However, Eurovent WG6A established classification for full load Energy Efficiency Ratio of each type of chillers. The classification follows the A to G approach used in the European Energy Label for household appliances but the limits between classes have been defined for the existing chillers as listed in Eurovent directory, see Table1 for cooling mode.

EER Class A	Air Cooled EER≥3.1	Water cooled EER≥5.05	Remote condenser >=3,55
B	2,9≤ EER< 3,1	4,65≤ EER<5,05	3,4≤ EER<3,55
C	2,7≤ EER< 2,9	4,25≤ EER<4,65	3,25≤ EER<3,4
D	2,5≤ EER< 2,7	3,85≤ EER<4,25	3,1≤ EER<3,25
E	2,3≤ EER< 2,5	3,45≤ EER<3,85	2,95≤ EER<3,1
F	2,1≤ EER< 2,3	3,05≤ EER<3,45	2,8≤ EER<2,95
G	<2,1	<3,05	<2,8

Next steps will be the elimination of Class G chillers (poorly efficient) from Certification and reviewing the classification of chillers according to ESEER instead of EER.

WG 6C "Air Handling Units" [4]

The WG 6C "Air Handling Units" after finalising the Life Cycle Cost project has realised that the most important part of this cost is the energy consumption. Although other factors, like maintenance, are also very important, the best means to decrease the life cycle cost of an air handling units is to design and operate in the optimum way with respect to energy consumption.

A Eurovent Document 6/8 called "Recommendations for calculations of energy consumption for Air Handling Units" has been prepared. This document provides the detailed analysis of all components: fans, cooling and heating coils, heat recovery units. The document 6/8 was published in May 2005.

WG 4B "Air Filters"

The Eurovent WG 4 B "Air Filters " has found, during the work on Life Cycle Cost project, that energy consumption represents the largest part of the cost. Although the filters are passive elements and do not consume energy directly, the pressure drop they introduce in the flow is related to fan consumption. Selection of filters and their replacement should be made taking into account not only their primary purpose (cleaning the air) but also the possible

energy saving. The relevant Eurovent Recommendation concerning calculation of Life cycle Cost of Air Filters was revised in 2004.

WG14 "Refrigerated Display Cabinets"

The WG 14 "Refrigerated Display Cabinets" has been working on annual energy consumption. The Group has been very much involved in the action undertaken by public authorities in the United Kingdom where Market Transformation Programme is aimed to increase the use of more efficient products. In order to implement the Eurovent Certification as the single data base for all Europe it will be necessary to highlight more efficient display cabinets. In addition, the users need to estimate the cost of annual energy. Conventional formulas have been presented, but more study will be necessary to achieve a valid method.

The energy efficiency appears now everywhere, for almost all products and under different aspects. In standardisation, the valid methods of testing have to be established. The certification will be more and more used not only to check the validity of claimed data but also to remove low efficiency products from the market.

The studies of Life Cycle Cost almost always shows that the energy consumption represent the highest part of this cost; even for passive elements like filters, a small decrease of pressure drop represents a huge economy of energy on the life cycle basis.

Eurovent/Cecomaf continues to show its commitment to energy efficiency improvement and tries to propose practical and easily verifiable measures.

Conclusion

Undeniably Eurovent Certification has greatly contributed in providing ground for fair competition and in delivering a framework for assuring to the users of HVACR products the cooling / heating performances to be expected from the products applied.
Equally the energy input at specified conditions could be certified.
Gradually in the last few years, when energy efficiency became a more hot topic in the general media in relation to global warming, the working groups within Eurovent took and still take important steps to distinguish further the more energy efficient products and determining minimum levels of energy efficiency, below which, products cannot be certified and thus cannot be listed in the Directory of Certified performance or the website of Eurovent Certification. Such orientation can only help the markets in applying more energy efficient products to the benefit of society as a whole and it's well being indoors.

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