

# Voluntary labelling and certification of HVAC products

For some years now the European commission has pushed for energy efficient products to be sold on the European market. Currently three types of initiatives are pushing in this direction:

- 1) The Ecodesign Directive (2005/32/EC and recast 2009/125/EC) on Energy Related Products (ErP) which aims to set minimum energy efficiency requirements for products sold in the European market.
- 2) The Energy Labelling Directive (92/75/EEC and recast 2010/30/EU) which aims to set uniform labels for products of the same type.
- 3) The Ecolabel Directive which aims to reward the most energy efficient products. The two first directives are closely linked as they cover identical product groups. The last one is a voluntary scheme and concern a few number of products within the HVAC sector.

In addition to these legal regulations the industry has developed several schemes for product labelling many of these include the energy and environmental aspect of products.



**Sylvain Courtey**  
Deputy Certification Manager Eurovent Certification  
s.courtey@eurovent-certification.com

This article will first provide an overview of current voluntary energy labels that are established by voluntary certification schemes which proceeded and/or complete the EU labels are presented. Finally interactions between private voluntary labels and mandatory EU labels are assessed.

## Voluntary energy labels

The European commission is not the solely body to develop energy labels. In the HVAC&R industry some organisations have created voluntary labels in order to promote energy efficient products. This is the case of Eurovent Certification which has put in place several labels in the past few years.

## Chillers and hydronic heat-pumps

Already in 2004 Eurovent certification defined energy efficiency classes for chillers and hydronic heat-pumps base on Energy Efficiency Ratio (EER) and Coefficient

**Table 1.** Definition of Eurovent Energy classes for Chillers and Heat pumps.

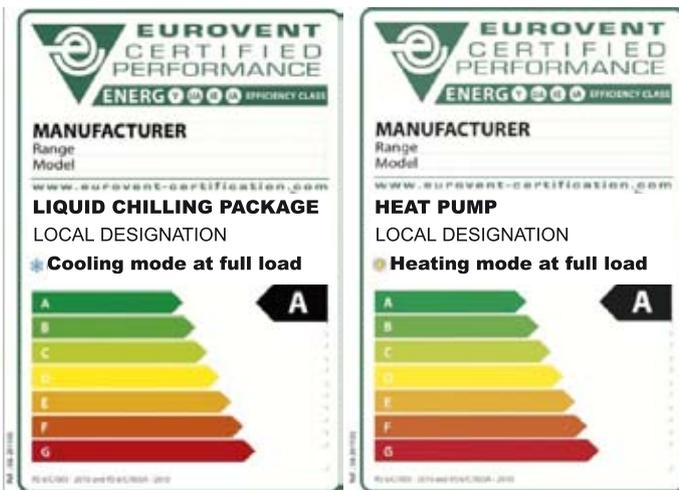
Cooling Mode					
Air-cooled LCP/A/./././N/./AC	Air-cooled ducted LCP/A/./././D/./AC	Air-cooled, Floor LCP/A/./././N/./CHF	Water-cooled LCP/W/./././N/./AC	Water-cooled LCP/W/./././N/./CHF	EER Class
≥ 3.1	≥ 2.7	≥ 3.8	≥ 5.05	≥ 5.1	A
2.9≤EER<3.1	2.5≤EER<2.7	3.65≤EER<3.8	4.65≤EER<5.05	4.9≤EER<5.1	B
2.7≤EER<2.9	2.3≤EER<2.5	3.5≤EER<3.65	4.25≤EER<4.65	4.7≤EER<4.9	C
2.5≤EER<2.7	2.1≤EER<2.3	3.35≤EER<3.5	3.85≤EER<4.25	4.5≤EER<4.7	D
2.3≤EER<2.5	1.9≤EER<2.1	3.2≤EER<3.35	3.45≤EER<3.85	4.3≤EER<4.5	E
2.1≤EER<2.3	1.7≤EER<1.9	3.05≤EER<3.2	3.05≤EER<3.45	4.1≤EER<4.3	F
< 2.1	< 1.7	< 3.05	< 3.05	< 4.1	G

Heating Mode					
Air-cooled LCP/A/R/././N/./AC	Air-cooled ducted LCP/A/R/././D/./AC	Air-cooled, Floor LCP/A/R/././N/./CHF	Water-cooled LCP/A/R/././N/./AC	Water-cooled LCP/A/R/././N/./CHF	COP Class
≥ 3.2	≥ 3.0	≥ 4.05	≥ 4.45	≥ 4.5	A
3.0≤COP<3.2	2.8≤COP<3.0	3.9≤COP<4.05	4.15≤COP<4.45	4.25≤COP<4.5	B
2.8≤COP<3.0	2.6≤COP<2.8	3.75≤COP<3.9	3.85≤COP<4.15	4≤COP<4.25	C
2.6≤COP<2.8	2.4≤COP<2.6	3.6≤COP<3.75	3.55≤COP<3.85	3.75≤COP<4	D
2.4≤COP<2.6	2.2≤COP<2.4	3.45≤COP<3.6	3.25≤COP<3.55	3.5≤COP<3.75	E
2.2≤COP<2.4	2.0≤COP<2.2	3.3≤COP<3.45	2.95≤COP<3.25	3.25≤COP<3.5	F
< 2.2	< 2.0	< 3.3	< 2.95	< 3.25	G

**Table 2.** Eurovent Certification Energy Classes for Heat Exchangers (Air cooled condensers units and dry coolers).

Class	Energy consumption	Condensers, Dry coolers	Dx Air Coolers
		$R_{\text{Condensers, Dry coolers}} = \frac{\text{Capacity SC wet}}{\text{Fan power cons}}$	$R_{\text{Dxaircoolers}} = \frac{\text{Capacity SC wet}}{\text{Fan power cons}} \times \sqrt{\frac{\text{fin spacing}}{4.5}}$
A++	Remarkably low	$R \geq 240$	$R \geq 45$
A+	Extremely low	$160 \leq R < 240$	$35 \leq R < 45$
A	Very low	$110 \leq R < 160$	$27 \leq R < 35$
B	Low	$70 \leq R < 110$	$21 \leq R < 27$
C	Medium	$45 \leq R < 70$	$16 \leq R < 21$
D	High	$30 \leq R < 45$	$12 \leq R < 16$
E	Very high	$R < 30$	$R < 12$



**Figure 1.** Eurovent Certification Chillers and hydronic heat-pumps labels. [www.eurovent-certification.com]

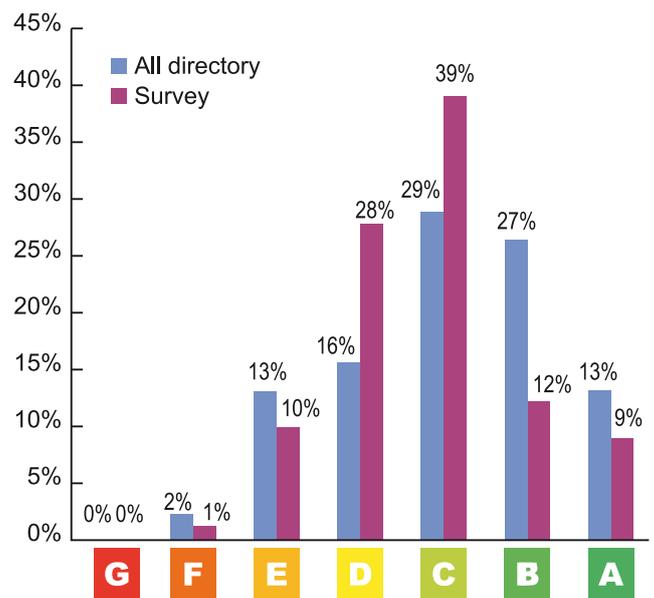
of Performance (COP) at standard conditions (see corresponding label and table of the definition of the energy classes).[1] This system covers both air-source and water-source units.

**Air cooled condensers units and dry coolers**

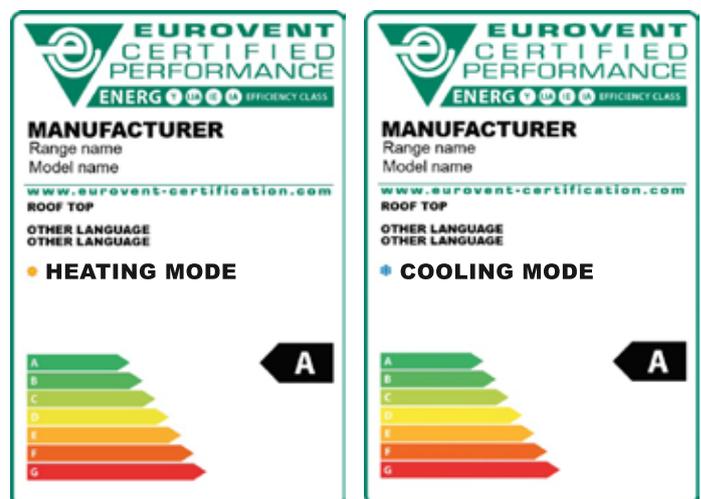
Energy classes for Air cooled condensers units and Dry coolers were defined in 2005. The one for Dx air coolers arose in 2011. The energy efficiency is based on the energy ratio R which is equal to the nominal capacity in kW divided by the total power input of the fan motors in kW at standard rating conditions.

**Rooftop units**

Energy efficiency classes for Rooftop units were defined in 2010 within the corresponding Eurovent Certification programme. The definition of the classes is based on the levels of the first EU energy label for air conditioners of the packaged type. These levels were found to be consistent with the values found on the market (see distribution of Rooftop units in Figure 2).



**Figure 2.** Distribution of Eurovent certified Rooftops units in 2010 according to the energy classes.



**Figure 3.** Eurovent Certification Rooftops Labels.

[1] Eurovent Certification Company, <http://www.eurovent-certification.com/>

**Air handling units**

The Eurovent energy efficiency label for Air handling units was created in 2010. This rating system allow to assess with only one letter the balanced effects of the air velocity in the fan section, the heat recovery efficiency and pressure drop, and finally the fan efficiency. The classification is done for three types of products: products designed for outdoor temperature lower than 9°C (for which the heat-recovery system takes a preminent role), products designed for outdoor temperature higher or equal to +9°C, and single extracts units.

**Fan Coil units**

Energy efficiency classes for fan coil units are available since January 2011 (Figure 5). This scheme covers ducted and non ducted units, two pipes and four pipes. The energy classes are based on “FCEER” and “FCCOP” (Fan Coil Energy Efficiency Ratio and Fan Coil Coefficient of Performance) for cooling and heating mode. This characteristic corresponds to a weighted average efficiency of the unit at the low, medium and high speeds (see formula below).

$$FCEER = \frac{5\% \cdot Pc_{high} + 30\% \cdot Pc_{med} + 65\% \cdot Pc_{low}}{5\% \cdot Pe(c)_{high} + 30\% \cdot Pe(c)_{med} + 65\% \cdot Pe(c)_{low}}$$

$$FCCOP = \frac{5\% \cdot Ph_{high} + 25\% \cdot Ph_{med} + 70\% \cdot Ph_{low}}{5\% \cdot Pe(h)_{high} + 25\% \cdot Pe(h)_{med} + 70\% \cdot Pe(h)_{low}}$$

The scale is very ambitious as currently a small part of the market can reach A class (see distribution in Figure 6). However, in view of the up-coming of EC fan motors units in the near future, the A class might be reached more often.

**Air filters**

Energy efficiency classes for air filter intended for ventilation were recently defined in the Eurovent Document 4/11 [2] (downloadable free of charge on www.eurovent-association.eu).

This method defines an annual energy consumption of an air filter in kWh/year based on the average pressure drop of the filter and standard airflow conditions.

The energy classes are defined for each filter efficiency class from G4 up to F9 (Table 3).

[2] Eurovent Document 4/11 “ENERGY EFFICIENCY CLASSIFICATION OF AIR FILTERS FOR GENERAL VENTILATION PURPOSES”, www.eurovent-association.com



Figure 4. Eurovent Certification Air Handling Unit Label.

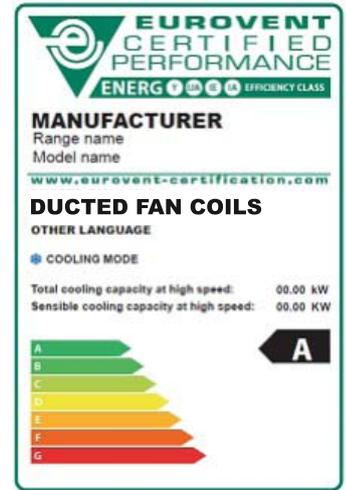


Figure 5. Eurovent Certification Fan Coil Units.

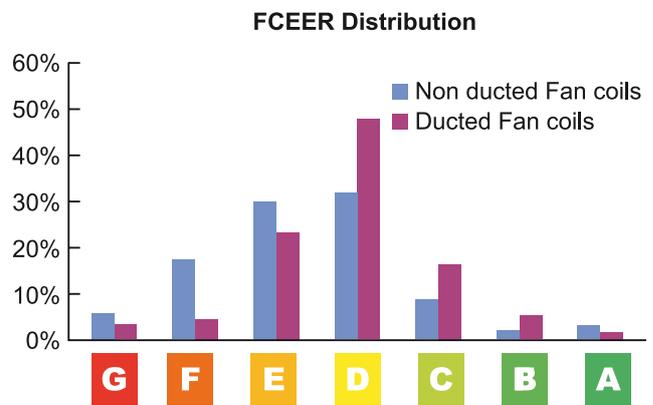


Figure 6. Distribution of Eurovent certified Fan Coil units in 2011 according to the energy classes.

It is important to note that a filter has to be chosen by designers firstly from the filter efficiency point of view according to the use. CEN standard EN 13779:2007 provides guidelines for good practice to this respect.

It is only when the filter efficiency class is defined that one can compare two filters which each other on an energy efficiency basis.

**Interaction between EU labels and voluntary labels**

**EU labels accelerate the standardization process**

The EU commission is able to send mandates to CEN in order to create or modify existing standards allowing supporting published directives. This was the case notably regarding the directives on air conditioners and heat-pumps which will be based on seasonal efficiency. The corresponding CEN standard EN 14825 has to take into account the method proposed by the directives and to include it. The new version of this standard has been published in 2012.

**Table 3.** Definition of Eurovent Energy classes for air filters.

Filter class	G4	M5	M6	F7	F8	F9
MTE	—	—	—	MTE ≥ 35%	MTE ≥ 55%	MTE ≥ 70%
	$M_G = 350$ g ASHRAE	$M_M = 250$ g ASHRAE		$M_F = 100$ g ASHRAE		
A	0 – 600 kWh	0 – 650 kWh	0 – 800 kWh	0 – 1200 kWh	0 – 1600 kWh	0 – 2000 kWh
B	> 600 kWh – 700 kWh	> 650 kWh – 780 kWh	> 800 kWh – 950 kWh	> 1200 kWh – 1450 kWh	> 1600 kWh – 1950 kWh	> 2000 kWh – 2500 kWh
C	> 700 kWh – 800 kWh	> 780 kWh – 910 kWh	> 950 kWh – 1100 kWh	> 1450 kWh – 1700 kWh	> 1950 kWh – 2300 kWh	> 2500 kWh – 3000 kWh
D	> 800 kWh – 900 kWh	> 910 kWh – 1040 kWh	> 1100 kWh – 1250 kWh	> 1700 kWh – 1950 kWh	> 2300 kWh – 2650 kWh	> 3000 kWh – 3500 kWh
E	> 900 kWh – 1000 kWh	> 1040 kWh – 1170 kWh	> 1250 kWh – 1400 kWh	> 1950 kWh – 2200 kWh	> 2650 kWh – 3000 kWh	> 3500 kWh – 4000 kWh
F	> 1000 kWh – 1100 kWh	> 1170 kWh – 1300 kWh	> 1400 kWh – 1550 kWh	> 2200 kWh – 2450 kWh	> 3000 kWh – 3350 kWh	> 4000 kWh – 4500 kWh
G	> 1100 kWh	> 1300 kWh	> 1550 kWh	> 2450 kWh	> 3350 kWh	> 4500 kWh

### Voluntary labels prepare the work for EU regulation

In some cases voluntary labels precede the EU labels. In such cases it is obvious that the work of the commission is facilitated as an already existing scheme is in place and used by the industry. For example, some references to the Eurovent labels are present in the studies to set-up a European label for Fan Coils, Rooftops and Chillers. [3] However for these product groups, it is likely that no EU label will be defined. In this case voluntary labels are complementary to EU ecodesign directives.

### Voluntary labels provide market data on energy efficiency

Voluntary energy labels like Eurovent Certification energy labels allow providing to EU commission useful data on energy efficiency. These data are crucial in order to prepare the most adequate regulation in terms of energy efficiency levels to be reached.

### Case where EU labels and voluntary labels have different requirements

This case can be illustrated by the air conditioners up to 12 kW (AC1 programme within Eurovent Certification). As said before these products are in the scope of a labelling directive since 2002. This directive refers to a standard allowing 15% tolerance on energy efficiency. The corresponding Eurovent Certification programme considers a tolerance of 8% for exactly the same product. This means that some non certified products declared as class A can only be rated B within the corresponding Eurovent Certification programme due to the stricter tolerance for this programme. This situation is not easy to manage for a certification scheme as some manufacturers are tempted to leave the certification programme in order to gain one energy class.

### Voluntary labels complete the market surveillance activity

Member states have the responsibility of the market surveillance regarding the Labelling directive. This market surveillance consists of checking the declaration of the performance of the products (correct labelling display on site) but also perform product testing. According to a study carried in 2009 by the Fraunhofer institute [4] it can be estimated that between 0 and 10 tests are performed per year on air conditioners up to 12 kW. At the same time, a voluntary third party certification scheme like Eurovent Certification performs more than 120 tests per year since 2000 on this type of products.

Given this role sharing out, market surveillance activities from member states should focus on non-certified products in order to complete the testing activity of voluntary certification bodies.

### Conclusion

Energy efficiency labelling is a boiling subject. The impact it has on customer behaviour makes it a powerful marketing tool but also more and more a powerful regulation tool. Both public and private sector can be at its initiative. We have seen that the two approaches were complementary if well coordinated. EU labels provide an impetus to standardization work at the European level whereas voluntary certification labelling schemes can accelerate the work of creation of EU labels if they are created before and allow for a given pool a products to have accurate market surveillance as soon as the EU label is put in place. Finally regarding market surveillance activity there is a clear possibility to have coordination between the two approaches in order to benefit from their complementarities.  $\mathfrak{E}$

[3] "Ecodesign Preparatory Study ENTR Lot 6 Air Conditioning and Ventilation Systems" Task 1 Lot 6, <http://www.ecohvac.eu/documents.htm>

[4] Survey of Compliance Directive 92/75/EEC (Energy Labeling), Fraunhofer Institute (2009)