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IMPACT OF THE ECODESIGN DIRECTIVE ON HVAC PRODUCTS

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Abstract: *The Ecodesign Directive and the Energy Labelling Directive are being implemented and will extensively modify the regulatory landscape for heating, ventilation and air conditioning (HVAC) products in the European market.*

The objective of the ErP-Directive is the reduction of energy consumption and the CO_2-emission rates as well as an increase of the overall share of renewable energies. This directive applies for all products placed on the market within the European Economic Area (EEA). Relevant for the AHUs is the EC-Directive 1253/2014/ EG that came into force on November 26th 2014. Within the framework of this directive and as of January 1st 2016, new requirements concerning the energy efficiency of AHUs will apply within the European Economic Area (EEA). The paper analyzes the changes these directives imply with respect to HVAC product performances and its consequences.

Key words: *ecodesign, energy related products directive, solid fuel boilers, space heaters, ventilation units.*

1. Introduction

The European ErP-Directive 2009/125/EG (Energy-related-Products-Directive), also called the Eco-Design Directive, defines the minimal requirements for energy-related products [1].

The objective of the ErP-Directive is the reduction of energy consumption and the CO_2-emission rates as well as an increase of the overall share of renewable energies. This directive applies for all products placed on the market within the European Economic Area (EEA).

This standard aimed ventilation units for intake air and exhaust air in a building or part of a building and enumerate – roof fans, duct fans, residential ventilation units and modular air handling units.

All these ventilation units has to fulfil a minimum efficiency and need to have at least a multi speed control which is under the response of the installer.

Two European directives, the Ecodesign Directive and the Energy Labelling Directive [2], together with their accompanying regulations [3], [4], are being implemented and will extensively modify the regulatory landscape for heating, ventilation and air conditioning (HVAC) products in the European market.

The paper analyses the changes these directives imply with respect to HVAC product performances and its consequences.

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2. The Ecodesign and Energy Labelling Directives

The Ecodesign Directive or Ecodesign Directive is European Directive 2009/125/EC.

This directive requires that energy-related products fulfil ecodesign requirements as defined in specific implementing measures, usually Commission Regulations, for the following HVAC appliances:

• space heaters up to 400 kW - gas and oil boilers, electric boilers, cogeneration of heat and power appliances, gas and electrical heat pumps ;

• water heaters and hot water storage tanks up to 400 kW -gas or oil water heaters, electric water heaters, heat pump water heaters, solar thermal water heaters, storage tanks up to 2,000 litres, water heaters and solar thermal device;

• air conditioners and air-to-air heat pumps up to 12 kW;

• ventilation units – for either residential (<1,000 m^3/h) or non-residential (>250 m^3/h);

and some of their components:

• fans with an electric motor from 125 W to 500 W;

• circulators and water pumps;

• electric motors.

The requirements of some of these regulations are already in force -e.g. for air conditioners since January 2013, e.g. since September 2015 for space heaters and water heaters and January 2016 for ventilation units.

An overview of all the requirements of the Ecodesign Directive can be found in the following figure 1.

Ecodesign DIRECTIVE 2009/125/EG			
	IEC-motors Regulation 640/2009	**Fans** Consideration of nozzle+impeller+motor+any control electronics Regulation 322/2011	**Ventilation systems** From 01.01.2016 Regulation 1253/2014- Ventilation units Regulation 1254/2014- labeling residential units
2018			Increased demands for ventilation units at all. Cancellation of the two lowest energy classes F,G on the labels
2017	**IEC- motors** 0.75-375Kw Efficiency class: IE3 or IE2+FU*		
2016			Mininum requirements for ventilation systems(>30W), equipment for residential ventilation with energy labelling
2015	**IEC- motors** 7,5-375Kw Efficiency class: IE3 or IE2+FU*	**Fans** ≥ 125W Minimum efficiency Stage 2**	
2013		**Fans** ≥ 125W Minimum efficiency Stage 1**	
2011	**IEC- motors** ≥ 0.75 Kw Efficiency class :IE2		

* Frequency converter

**Calculated according to a defined formula

Fig. 1. *Ecodesign Directive [5]*

The process of preparation of regulations, and preparation of Eco-design regulations in particular, has five stages:

1. Working plan;
2. Preparatory study- Stakeholder meetings;
3. Draft regulation - Consultation forum;
4. Regulatory Committee;
5. Final regulation.

The whole process takes 55 months as a minimum, but in practice the whole process can take up to 10 years.

It's easy to see that the minimum efficiency of a non-residential ventilation unit with a run-around heat recovery is 63% from 1st of January 2016, and will be 68% from 1st of January 2018, for other types of heat recovery system the minimum is 67% (2016) and 73% in 2018.

Regarding large capacity heat pumps and air conditioners, chillers, fan coil units, solid fuel boilers the European Commission prepared other regulations include requirements for :

- energy performance levels (energy efficiency, stand-by losses, heat losses);
- sound power levels;
- nitrogen oxide emissions for combustion appliances (boilers, water heaters, cogeneration systems, gas or oil heat pumps);
- some specific aspects of product design (for example mandatory multi-speed drive or variable speed drive for ventilation units).

The Ecodesign Directive requires the manufacturer to keep and make available the CE marking and defining new methods for the assessment of the conventional performance of products.

The European Directive 2010/30/EC, also called the **Energy Labelling Directive**, relates to the indication of the consumption of energy and other resources by energy-related products through labelling and information to end-users.

Commission Delegated Regulations supplementing Directive 2010/30/EC have already been published for household air conditioners, space heaters and water heaters (since September 2015) and residential ventilation units (since January 2016). They define the energy efficiency classes, the contents of the label and the product information to be made available to consumers.

These regulations may have a more limited scope than the ErP regulations as far as the capacity of the product is concerned (e.g. space heaters labelled up to 70 kW, or ventilation units labelled only if for residential use). However, some energy-related products may have ErP requirements but no energy labelling.

The label includes information such as:

- for space heaters: energy efficiency class for space heating and if applicable for water heating, rated heat output for the three reference climates and sound power level;
- for air conditioners: energy efficiency class for cooling and, if applicable for heating, design load, seasonal efficiency (or efficiency), annual (or hourly) energy consumption and sound power level of indoor and/or outdoor units;
- for water heaters: energy efficiency class, annual energy consumption and sound power level;
- for hot water storage tanks: energy efficiency class, heat losses and volume;
- for residential ventilation units: energy efficiency class, maximum air flow rate and sound power level.

For residential ventilation units, the main requirement is now expressed as a "Specific Energy Consumption for ventilation per m² heated floor area of a dwelling or building" (SEC). The main parameters affecting the SEC value are the recovered heat from extract air and the fan energy consumption, but also many other parameters like the type of control of the unit, the motor and drive type, and possible defrosting are also taken into account.

The SEC value also determines the energy class in the energy label of residential ventilation units. The label shall also include the following information, see ventilation units.

The label shall provide the following information:

- supplier's name or trade mark,
- supplier's model identifier;
- annual electricity consumption,

• energy efficiency class – energy efficiency is indicated for an 'average' climate;
• annual heating saved (AHS) with a map of Europe displaying three indicative heating
seasons and corresponding colour squares, accompanied by a 'house' symbol with the text '100 m²'
• sound power level (LWA) in dB,
• maximum flow rate in m³/h

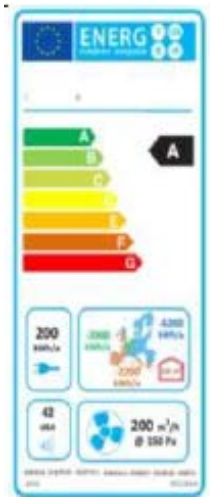

Fig. 2. *Proposed layout of the energy label for residential*

3. Conclusions

The Ecodesign Directive is meant to be used together with other policy tools, in particular the Energy Labelling Directive, and allows the Commission to regulate the minimum performance of products.

It was born new methods to assess product energy efficiency. These methods are generally very different from those that are used to assess the performance of HVAC products in the calculation of the energy performance of buildings (national transpositions of the European Energy Performance of Buildings Directive 2010/31/EU)[6].

In the same time, they define requirements that will gradually take less efficient products out of the market. In some cases, certain technologies could cease to exist on the market;

These new rules introduced labelling of products providing better information for consumers.

References

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