

EUROPEAN HEAT PUMP SUMMIT

POWERED BY CHILLVENTA

SYMPOSIUM + EXPO
NUREMBERG, 20–21.10.2015

Industrial | Commercial | Residential
Heating & Cooling | Components & Equipment

hp-summit.de

NÜRNBERG / MESSE

Evolution of Heat Pump Certification

François-Xavier BALL

- Introducing product certification
- Overview of Eurovent Certita Certification
- Main trends in the evolution of Heat Pump certification
 - technologies
 - standards and regulatory framework
 - breakthroughs
- Conclusion

- **Introducing product certification**
- Overview of Eurovent Certita Certification
- Main trends in the evolution of Heat Pump certification
 - technologies
 - standards and regulatory framework
 - breakthroughs
- Conclusion



What is product certification ?

According to the ISO/IEC 17000 standard related to conformity assessment,

Product certification is a conformity assessment whereby :

... a **third party**

... issues a **statement**

... that **fulfilment of specified requirements** has been demonstrated for a given product,

1. Certification **provides confidence** to interested parties

Certification : how does it work ?



... Certification **outlines the rules, procedures & management** for carrying out certification.

... It establishes **specific requirements** for a product, process, system in collaboration with stakeholders

...and uses a **third party** to ensure that the fulfillment of specified requirements has been demonstrated.

2. **Third party guarantees independence** towards product manufacturer, contractor, designer and specifier.

Accredited Certification Body the ultimate value



... **Certification** is the process of **checking** whether a product fulfills specified requirements and is carried out by a Certification Body.

... **Accreditation** is the process of assessing the **competence and impartiality** of the Certification Body and is carried out by an Accreditation Body.

3. Accreditation **guarantees impartiality** and **competence**

-
- Introducing product certification
 - **Overview of Eurovent Certita Certification**
 - Main trends in the evolution of Heat Pump certification
 - technologies
 - standards and regulatory framework
 - breakthroughs
 - Conclusion

Eurovent Certita Certification (ECC): a European certification body focused on HVAC-R products

- Managing, over 20 years of experience, 38 product certification programmes related to indoor climate, ventilation and air quality, refrigeration and Food cold chain
- Accredited against EN ISO/CEI 17065 standard by Cofrac, a signatory of the European cooperation for accreditation (EA) multilateral agreement
- Granting certification marks ensuring that products not only comply with specifications but will perform as advertised



- **Scope** : we certify products manufactured in 44 countries by 615 manufacturers using 745 trade marks
- **Assessment** : 1800 verification tests and more than 400 audits in 27 countries per year
- **Delivery** : 95 000 models certified, 24/7 online access to certified product lists and performances
- **Recognition** : 66 % of HVAC-R products sold in Europe are ECP certified

- Introducing product certification
- Overview of Eurovent Certita Certification
- **Main trends in the evolution of Heat Pump certification**
 - technologies
 - standards and regulatory framework
 - breakthroughs
- Conclusion

Certification schemes managed by ECC for Heat Pumps



*ECP mark
since 1995*



HEAT PUMPS

www.marque-nf.com

NF Heat Pumps mark

A brief history of Heat Pump certification : recent milestones

Date	Event
2007	Introducing ESEER in the Eurovent Programme for Chillers and Heat Pumps Launching the NF Heat Pump programme
2012	Extending certification to dual service heat pumps
2013	Extending certification to gas heat pumps Introducing certification of seasonal performances
2014	First certification of hybrid systems
2015	Extending certification to heat pumps producing collective sanitary hot water Creation of the Euro Heat Pump programme An agreement between Eurovent Certita Certification and DIN CERTCO enables to grant up to 3 quality marks through a single entry point

All technologies and operation modes of Heat Pumps are covered

- Air-to-Air Heat Pumps
- Air-to-Water Heat Pumps
- Water-to-Water Heat Pumps
- Brine-to-Water Heat Pumps
- Gas-fired absorption and adsorption heat pump
- Swimming pool Heat Pumps
- Heating and cooling modes
- Dual mode HP for Sanitary hot water

But also:

- Rooftops Units
- VRF systems

From “Standard” performance to “Seasonal” performance

Before seasonal performances were introduced by European Regulations, the industry has implemented:

ESEER (European Seasonal Energy Efficiency Ratio),

- **1st** seasonal performance for the cooling mode
- **Certified** by Eurovent Certita **since 2007**, for the programme “Chillers & Heat Pumps”

Formula:

$$\text{ESEER} = 0.03 \times \text{EER}_{100\%} + 0.33 \times \text{EER}_{75\%} + 0.41 \times \text{EER}_{50\%} + 0.23 \times \text{EER}_{25\%}$$

based on: Efficiency at full load, but also Efficiencies at partial load.

From “Standard” performance to “Seasonal” performance

For many years, energy performance characterization for heat pumps has been expressed by nominal performances (from EN 14511) :

- **EER** for cooling mode
- **COP** for heating mode

Since 2013, European Regulations enforced migration to seasonal performance (EN 14825) to cover more and more types of products:

- **SEER** for cooling mode
- **SCOP** for heating mode

➔ Took into account that during the whole year, a thermodynamic system **works** in function of the demand at **Part Load conditions** and for specific climates.

From “Standard” performance to “Seasonal” performance

Recently published or on the verge of being published : the seasonal coefficient of performance (**SCOP**) in **heating mode**, and its equivalents **SEER** and **SEPR** in cooling mode,

In order to compare the heating solutions between different technologies, the seasonal effectiveness is transformed in primary energy etas (**η_s**), expressed in percentage (%)

For example for Air-to-Water HP, $\eta_s = \frac{SCOP \times 100\%}{2,5} - F(i)$ with $F(i) = 3\%$

The next regulations will mention :

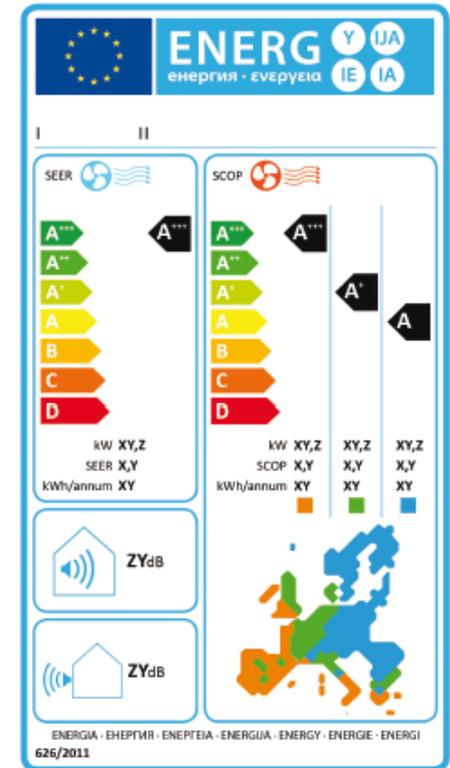
- **$\eta_{s,h}$** (or η_s) for heating mode
- **$\eta_{s,c}$** for cooling mode

From “Standard” performance to “Seasonal” performance

Eurovent Certita Certification Programmes are always in line with each European Directive :

1st example - From 1st January 2013:

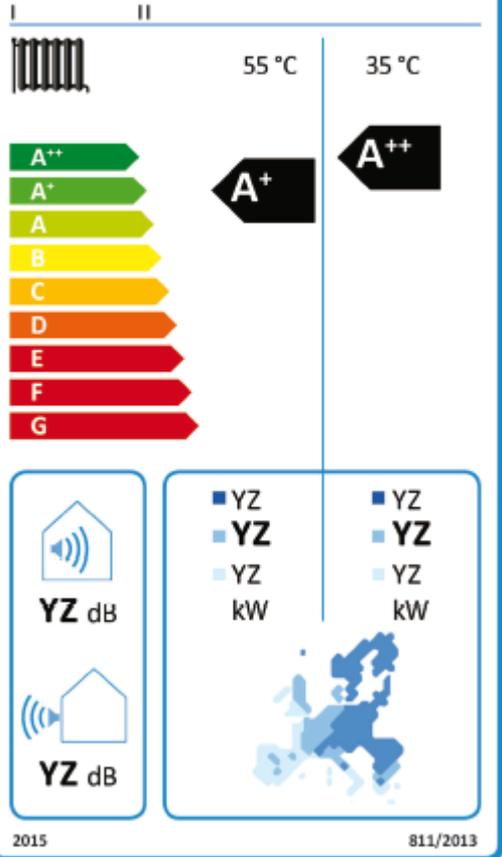
- Implementation of eco-design 206/2012 and labelling 626/2011 regulations for **Air Conditioners ≤ 12 kW**,
- Manufacturers are required to **declare the SEER & SCOP**
- Products have to meet the thresholds of the regulation to be covered by the programme.





26 September 2015

From “Standard” performance to “Seasonal” performance



Since Autumn of 2014 for NF Heat Pumps, manufacturers can certify **SCOP** and seasonal energy efficiency for the heating “ η_s ”, covered by regulations 813/2013 & 811/2013.

Since December 2014, the reference document LCP-HP (Liquid chilling packages and heat pumps) requires manufacturers to declare the **SCOP and η_s** , which are **now published** on ECC web site.

All programmes revised in order to be in line with the implementation of these 2 European Directives.

From “Standard” performance to “Seasonal” performance

In the 2016 or 2017 revision of the reference documents AC2, AC3 (**Air-Conditioners units between 12 kW and 100 kW**) and RT (**Rooftop Units**), manufacturers shall declare:

- **SCOP & SEER**
- η_s

In the 2016 revision of reference documents for **LCP-HP** programme, manufacturers shall declare also **SEER** and the η_s for **cooling** mode.

➔ To be in line for the on-going regulation concerning **ENTR Lot 1 / ENER Lot 21** referring to Ecodesign requirements for air heating products, cooling products and high temperature chillers.

Heat Pumps with Sanitary Hot Water

New Directives **812/2013** & **814/2013** introduced new requirements and new performances for **Heat pumps combined with hot water tank.**

August 2012: NF Heat Pumps includes the **certification of dual service** heat pumps producing sanitary hot water together with space room heating

NF PAC requirements are fully in accordance with these European Directives

Breakthrough Heat Pumps with Sanitary Hot Water

June 2014: NF Heat Pumps ensure the further **certification** of heat pumps and storage tanks **with a reference simulation tool.**

April 2015 : the scope of the NF Heat Pump certification is enlarged to handle production of **collective sanitary hot water.**

Simulation enables to certify a number of models using a limited number of verification tests

This programme is related to **the enhancement of the system's performance as a whole.**

The **first covered products are hybrid heat pumps** combining a heat pump to a boiler,

→ the operation of the system **can be optimized** so as to use fossil fuels or electricity in **the most favourable conditions** during the key operating points of the product.

The **first certificate** was published in **November 2014.**

New

A European Heat Pump Certification program: “Euro Heat Pump”

The European Heat Pump Certification program: “**Euro Heat Pump**” is a **bridge between the NF** programme and the **ECP mark**.

The first certificates have been granted on Spring 2015 and the data are available online on the website.

www.eurovent-certification.com

Moreover, directly on the web site the on-line function allows to edit a per product performance report

New

Cooperation between Eurovent Certita Certification and DIN CERTCO

- Eurovent Certita Certification and the German certification body DIN CERTCO have signed a cooperation agreement involving, among other programmes, the certification of heat pumps
- This enable manufacturers to get access to up to 3 certification marks through one single entry point

European Heat Pump Programme



1 Certification Process
1 Entry



3 Certification Marks



EUROPEAN
HEAT PUMP
PROGRAM



Some figures for certified Heat Pumps (Oct. 2015)

Type	Number of models certified by Eurovent Certita Certification
Air/air	2 850
Air/Water	14 400
Water/Water	3 760
Glycol Water/Water	470
Dual service	190
Rooftop units	470
Variable Refrigerant Flow	185
Total number	22 325

^a including Heat pumps and Chillers

^b including Heat pumps

www.eurovent-certification.com / www.certita.fr / www.certiflash.com

- Introducing product certification
- Overview of Eurovent Certita Certification
- Main trends in the evolution of Heat Pump certification
 - technologies
 - standards and regulatory framework
 - breakthroughs
- **Conclusion**



What value for the Heat Pump Certification

In an environment where significant changes are affecting the Heat Pumps market :

- **New** European Regulation
- **New** thresholds to fulfil
- **New** performances
- **New** methodology of Testing



What value for the Heat Pump Certification

Certification brings **confidence**

- ... equipment is **compliant** to design specification
- ... **energy savings** can be demonstrated
- ... product meets initial **investment target**

Certification is the ground for **fair competition**

- ... **equal terms** for a common language
- ... same testing standards for **comparable data**

Certification is key to **progress**

- ... by improving products, gaining efficiency, certified companies or product win **new market**

EUROPEAN HEAT PUMP SUMMIT

POWERED BY CHILLVENTA

SYMPOSIUM + EXPO
NUREMBERG, 20–21.10.2015

Industrial | Commercial | Residential
Heating & Cooling | Components & Equipment

hp-summit.de

NÜRNBERG / MESSE