



The Importance of Quality in a Growing European Heat Pump Market

An overview of regulatory, certification and
market surveillance requirements

Content

- 02 Foreword
- 03 Market growth and the importance of quality
- 04 Status of market surveillance in Europe
- 05 The common EU framework for product marketing (Council Decision 768/2008)
- 07 The Heat Pump KEYMARK
- 08 Certification for the Heat Pump KEYMARK
- 09 Testing laboratory and production monitoring
- 10 The “Blue Guide”: A contribution for a better understanding of essential EU product rules
- 11 Annex: authors with contact details

Foreword

An acceleration of deployment of technologies using renewable energy sources is observable also in the heating sector. Biomass boilers, solar thermal collectors and heat pumps – combined with energy distribution systems in cities – are essential components in the energy transition towards a decarbonized system.

Quality of the products sold and the systems installed will be key to maintain end-user trust in the reliability of the technologies deployed. In order to reap the benefits of developing and selling products in a single EU market, a single approach towards ensuring product quality is preferable.

This white paper summarizes the background of the KEYMARK system's introduction to the market for heat pump technology. It aims at providing market players with a brief overview on the market and regulatory reasons for its creation as well as its benefits the perspectives of end-users, government funding bodies and market surveillance authorities.

Moreover, the paper is aimed at initiating a discussion – we hope it is useful and invite our readers actively to participate by contacting the authors in case of questions.

Market growth and the importance of quality

Heat pump technology is among the most promising solutions for a decarbonized European heating and cooling sector.

THOMAS NOWAK

Using renewable energy sources or energy from waste, they significantly reduce CO₂ and particulate matter emissions are among the few solutions that achieve the top efficiency rating in boilers (A+++ today). Additional benefits are the provision of local employment, prevention of particulate matter emissions and the provision of demand side flexibility, thus contributing to more stable electric grids with a high, share of Variable Renewable Energy (VRE).

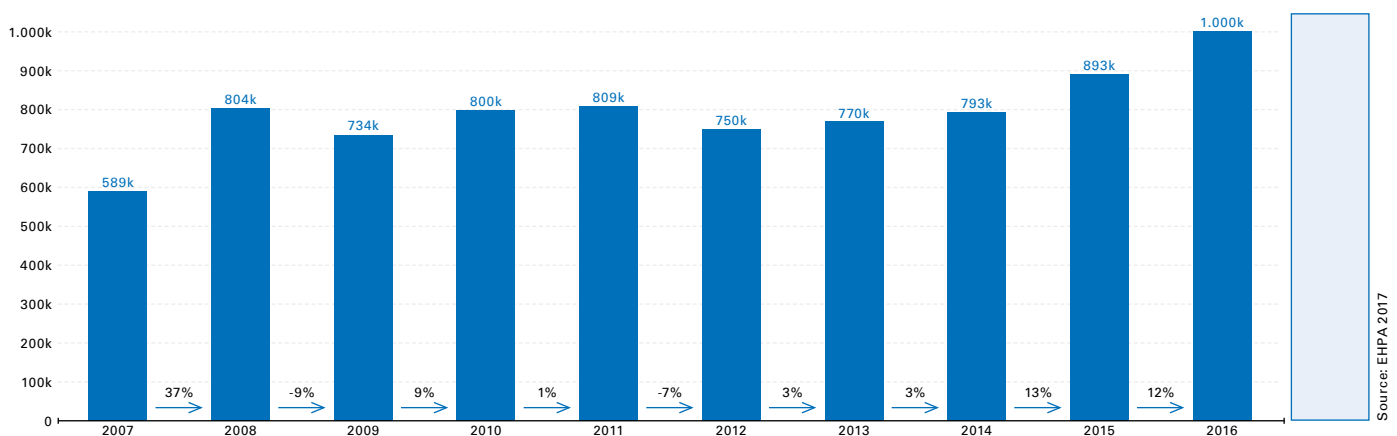
All of these factors have led to more heat pump sales across Europe. Over the past two years, the European heat pump market has seen double digit growth (13 % in 2015 and 12 % in 2016) and the early numbers for 2017 confirm this trend to continue. This means that from 2017 onwards, each year more than a million units are added to the market, leading to an expected doubling of the installed stock between 2016 (10 million units) and 2024 (20 million units). This development will lead to continuous cost reductions,

making heat pumps even more competitive and maintaining or even accelerating the technologies' growth potential. A much faster market development will lead to more players entering the market. It will also lead to more users that must ensure on the efficiency and reliability of the product chosen.

Currently, heat pump technology is heavily regulated via legislation affecting components, products and even systems setting requirements for safety, the environmental footprint and efficiency. However, compliance with many of the requirements, in particular those set by the Ecodesign regulation and its implementing measures, is expressed by manufacturer self-declaration.

For many member states of the European Union this is deemed not sufficient when it comes to "proof of quality" for the purpose of receiving government subsidies. Instead

ACCUMULATED: 9.5 MILLION UNITS INSTALLED



Development of heat pump sales in Europe, 2007 – 2017. Detailed numbers are available at <http://stats.ehpa.org>.

of using existing tools they have set up their own systems asking heat pump manufacturers and distributors to fulfill a range of requirements, often consistent from one country to another. This situation influences market success. While a CE mark allows all products brought to market in one country also to be sold in all other countries of the single European market, not complying with requirements such as those set for subsidies or for the recognition in the calculation tools for specifiers will limit the sales potential of such products. While setting such requirements is the prerogative of each member state of the Union, it must be recognized that differing requirements counterbalance the advantages of a single market as they create much higher administration and compliance costs and in fact reduce product competitiveness without increasing the quality of products in the market place.

The industry is convinced, that instead of more requirements, the market needs a single set of agreed upon quality principles that should be used by all member states and that can then be complied with by manufacturers.

Currently observable faster sales growth as well as the development of new markets brings with it the risk of additional quality requirements in some or all European states. In consequence, several heat pump industry stakeholders have cooperated on the development of the Heat Pump KEYMARK. It is a certification scheme fit for a single European market place complementing the requirements of the Ecodesign regulations with an independent certification system. It is based on third party testing of product types for efficiency and safety, regular manufacturing site inspections and verification of quality management systems in the manufacturers' organization. In order to avoid yet another set of divergent rules, the product safety requirements are based on European Standard EN 14511-4 while the efficiency requirements correspond to those set by Ecodesign for heaters, combi-heater, hot water heaters and small air-conditioning units (regulations 206/2012/EU, 813/2013/EU and 814/2013/EU).

The scheme is owned by CEN and executed by independent certification bodies across Europe. A product that is tested and certified once should be recognized for its quality across Europe.

Status of market surveillance in Europe

The goal of market surveillance is to protect citizens from unsafe products and to strengthen the competitiveness of all those involved, as well as to ensure a transparent market in terms of the products' energy efficiency and energy consumption.

MARIO REIMBOLD

In accordance with the Product Safety Act, supervisory authorities have to check products made available on the market and in the event of non-conformity, sanction those responsible. The regulation 811/2013 on the energy labeling of room heaters, combined heaters, composite systems consisting of room heaters, temperature controllers and solar control units as well as composite systems consisting of combined heaters, temperature controllers and solar

installations creates a legally binding framework throughout Europe. The manufacturer has to test his equipment in accordance with this regulation and label it according to the test results.

In the case of market surveillance, the competent authorities of the member states examine a test object of the model and inform other member state authorities of the

test results. The distributor is required to support the institute entrusted with carrying out the tests so that testing can be completed in accordance with regulation 811/2013.

All the necessary equipment must be provided and conditions met. For example, setting parameters such as inverter frequencies for heat pumps, fan speeds for gas condensing boilers, etc. must be set on site or appropriate setting options must be made available. Experienced employees of the respective manufacturer may be present at the tests and provide support. Ideally, there is a test report from which the test parameters used for the energy labeling assessment can be taken.

If, taking into account the tolerances specified in regulation 811/2013, testing results in non-conformity the manufacturer may have three further test objects of the same model tested. Should the mean value of all four tests deviate from the declared value, again taking the tolerances specified in regulation 811/2013 into account, appropriate sanctions will be introduced. Furthermore, in the event of proven non-conformity, all testing costs are borne by the manufacturer.

If you have any questions on market surveillance, please contact us or the market surveillance authorities of the EU member states.

The common EU framework for product marketing (Council Decision 768/2008)

Decision 768/2008/EC establishes the common framework for the drawing up of community harmonization legislation. Its objective is to ensure the safety of citizens, reduce the number of products on the market which do not satisfy the requirements set out in EU legislation, and improve the quality of the work performed by bodies active in testing and certifying products.

FRANCESCA CORAZZA

This decision provides definitions and outlines general obligations for economic operators to demonstrate that products made available on the market conform to the applicable requirements. It also updates and consolidates the technical instruments already used in existing Union harmonization legislation. More specifically, it establishes a number of conformity assessment procedures and sets out common criteria for the notification of the conformity assessment bodies.

Decision 768 allows for a number of different approaches (called modules) to ensure conformity with declared or legally required characteristics for both the design and manufacturing phase of a product. Requirements can apply to the design, the type or the every product.

A. Internal production control	B. Type examination	G. Unit verification	H. Full quality assurance
<p>Manufacturer</p> <ul style="list-style-type: none"> keeps technical documentation at the disposal of national authorities 	<p>Manufacturer submits to notified body</p> <ul style="list-style-type: none"> technical documentation supporting evidence for the adequacy of the technical design solution specimen(s), representative of the production envisaged, as required <p>Notified body</p> <ul style="list-style-type: none"> ascertains conformity with essential requirements examines technical documentation and supporting evidence to assess adequacy of the technical design for specimen(s): carries out tests, if necessary issues EC-type examination certificate 	<p>Manufacturer</p> <ul style="list-style-type: none"> submits technical documentation 	<p>EN ISO 9001:2000 ⁽⁴⁾</p> <p>Manufacturer</p> <ul style="list-style-type: none"> operates an approved quality system for design submits technical documentation <p>Notified body</p> <ul style="list-style-type: none"> carries out surveillance of the QS <p>H1 Notified body</p> <ul style="list-style-type: none"> verifies conformity of design ⁽¹⁾ issues EC-design examination certificate ⁽¹⁾

	C. Conformity to type	D. Production quality assurance	E. Product quality assurance	F. Product verification		
A.	C.	D.	E.	F.		
<p>Manufacturer</p> <ul style="list-style-type: none"> declares conformity with essential requirements affixes required conformity marking 	<p>Manufacturer</p> <ul style="list-style-type: none"> declares conformity with approved type affixes required conformity marking 	<p>EN ISO 9001:2000 ⁽²⁾</p> <p>Manufacturer</p> <ul style="list-style-type: none"> operates an approved quality system for production, final inspection and testing declares conformity with approved type affixes required conformity marking 	<p>EN ISO 9001:2000 ⁽³⁾</p> <p>Manufacturer</p> <ul style="list-style-type: none"> operates an approved quality system for final inspection and testing declares conformity with approved type affixes required conformity marking 	<p>Manufacturer</p> <ul style="list-style-type: none"> declare conformity with approved type affixes required conformity marking 	<p>Manufacturer</p> <ul style="list-style-type: none"> submits product declares conformity affixes required conformity marking 	<p>Manufacturer</p> <ul style="list-style-type: none"> operates an approved QS for production, final inspection and testing declares conformity affixes required conformity marking
A1.	C1.	D1.	E1.	F1.		
<p>Accredited in-house body or notified body</p> <ul style="list-style-type: none"> tests on specific aspects of the product ⁽¹⁾ 	<p>Accredited in-house body or notified body</p> <ul style="list-style-type: none"> tests on specific aspects of the product ⁽¹⁾ 	<p>declares conformity to essential requirements</p> <ul style="list-style-type: none"> affixes required conformity marking 	<p>declares conformity to essential requirements</p> <ul style="list-style-type: none"> affixes required conformity marking 	<p>declares conformity to essential requirements</p> <ul style="list-style-type: none"> affixes required conformity marking 		
A2.	C2.					
<ul style="list-style-type: none"> Product checks at random intervals ⁽¹⁾ 	<ul style="list-style-type: none"> Product checks at random intervals ⁽¹⁾ 	<p>Notified body</p> <ul style="list-style-type: none"> approves the QS carries out surveillance of the QS 	<p>Notified body</p> <ul style="list-style-type: none"> approves the QS carries out surveillance of the QS 	<p>Notified body</p> <ul style="list-style-type: none"> verifies conformity to essential requirements issues certificate of conformity 	<p>Notified body</p> <ul style="list-style-type: none"> verifies conformity to essential requirements issues certificate of conformity 	<p>Notified body</p> <ul style="list-style-type: none"> carries out surveillance of the QS

(1) Supplementary requirements which may be used in sectoral legislation.
 (2) Except for subclause 7.3 and requirements relating to customer satisfaction and continual improvement.
 (3) Except for subclauses 7.1, 7.2.3, 7.3, 7.4, 7.5.1, 7.5.2, 7.5.3 and requirements relating to customer satisfaction and continual improvement.
 (4) Except for requirements relating to customer satisfaction and continual improvement.

For the conformity assessment procedure under Ecodesign for heat pumps, the manufacturer can select among design control (annex IV of directive 125/2009/EU) and management system (annex V IV of directive 125/2009/EU). Complying with one of these requirements is essential for affixing the CE marking as proof of a product's conformity with the levels of protection of collective interests imposed by the Community harmonization legislation. Other markings may be used as long as they contribute to the improvement of consumer protection and are not covered by Community harmonization legislation.

Design control is very similar (but not identical) to module A of Commission decision 758/2008/EC (Internal production control). When it comes to conformity declaration for domestic boilers fuelled by gas or oil, a third party verification is required according to article 7(2) and 8 of directive 1992/42/EEC. (This is one of the measures referred to in the Ecodesign directive and, as a result, the CE marking attached to a domestic gas boiler indicates compliance with both directive 1992/42 and 2009/142/EC).

According to Ecodesign directive, no specific modules are required for heat pumps currently. In case third party verification will be deemed as mandatory for heat pumps in the future, the Heat Pump KEYMARK or other certification systems should be considered as a valid proof of such a requirement. The Heat Pump KEYMARK exceeds the requirements of the following modules of decision 768/2008:

- Module B (EC-type examination)
- Module D (Quality assurance of production process)
- Module C (Conformity to type, but it should be noted that these requirements are exceeded as the factory production audit foreseen in the Heat Pump KEYMARK verification is not part of module C)
- Requirements of module H are covered with respect to the design and production phase.

Products certified under the Heat Pump KEYMARK fulfil ambitious requirements to product and production quality. They should be recognized as sufficient to comply with third party testing/verification/certification requirements on which the payment of subsidies is based.

The Heat Pump KEYMARK

The Heat Pump KEYMARK is a voluntary, independent, European certification mark compliant with the requirements of ISO Type 5.

FRANCESCA CORAZZA/THOMAS NOWAK

The scheme is currently applicable for all heat pumps covered under the Ecodesign implementing measures for small air-air heat pumps, heating heat pumps, combination heat pumps and hot water heat pumps (as covered by Ecodesign, EU Regulations 206/2012, 813/2013 and 814/2013) An extension of the scheme is feasible and already under consideration. Performance tests are executed by third-party testing labs based on the requirements of Ecodesign, while factory inspections are executed by independent auditors and ongoing product and production monitoring is performed.

The Heat Pump KEYMARK scheme was developed by the heat pump industry in 2015. Is owned by the European Committee for Standardization (CEN) and executed by authorized certification bodies participating in the scheme. By end of 2017, a total of seven certification bodies are participating in the Heat Pump Keymark scheme, however it is accessible for all interested bodies. By applying a consistent quality concept to all certified heat pump types based on an initial performance assessment and regular re-tests as well as factory production controls, it offers a single certificate for a single European market and provides a robust tool to ensure quality.

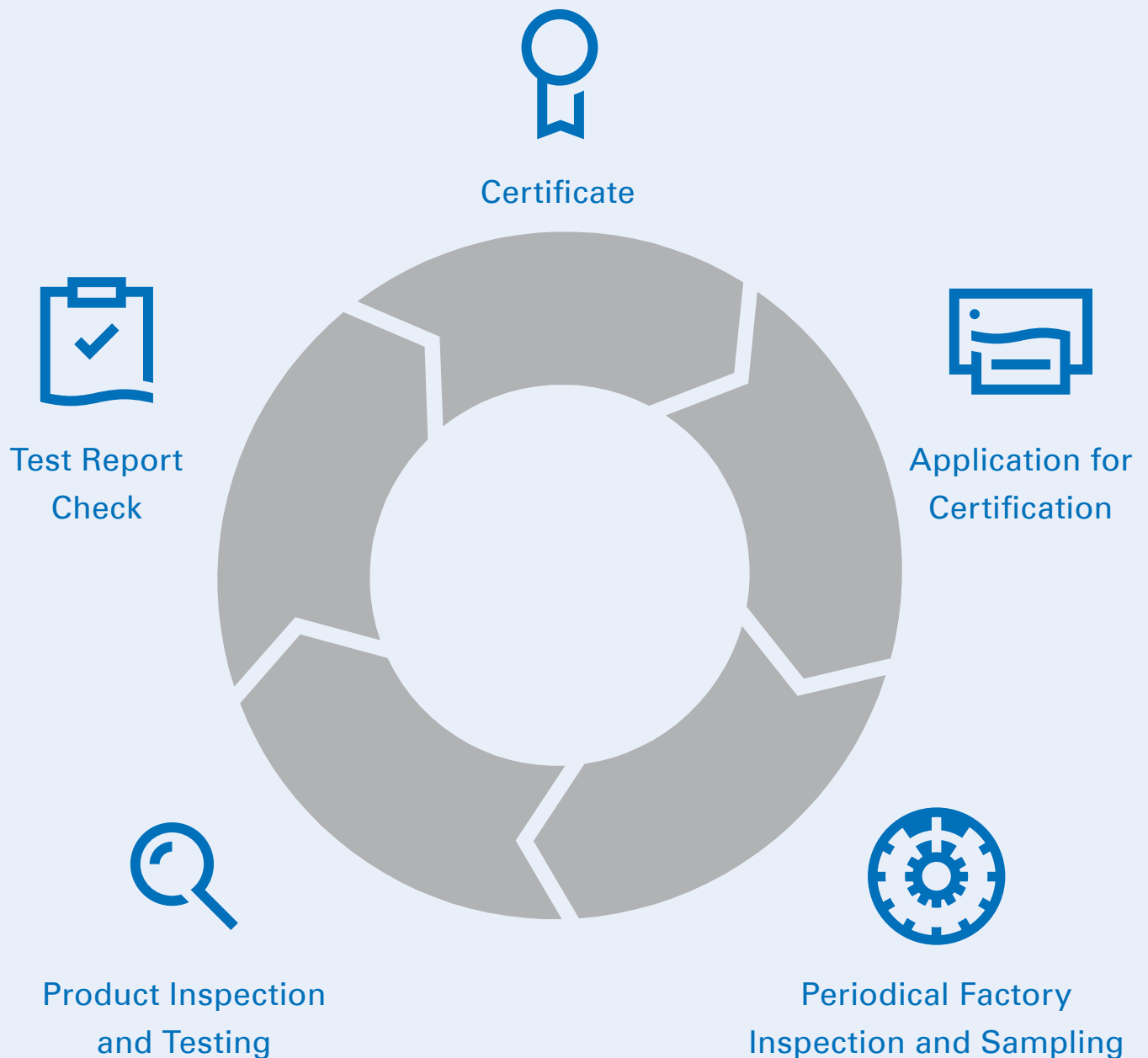


KEYMARK.
Source: EHPA

Certification for Heat Pump KEYMARK

Successful certification according to Heat Pump KEYMARK can greatly impact the customer's purchasing decision. It gives the consumer confidence that they have bought a quality product.

DR. INA FÖRSTER / KATHARINA VEHRING



Confidence in the product arises from the interplay of three neutral parties: an independent and accredited certification body and its partners for testing and inspection.

The certification body is the first point of contact and guides manufacturers competently through the certification process. The certification body offers support choosing appropriate testing institutes and authorized inspectors, in keeping to the time schedule and in following the requirements in line with the scheme rules. The certification body performs the conformity assessment of documents and reports and ultimately issues the desired Heat Pump KEYMARK certificates.

THE CERTIFICATION PROCESS CONSISTS OF THE FOLLOWING PHASES:

- application of manufacturer or distributor with a participating certification body
- factory production inspection by an authorized inspector including the sampling

- testing of the sampled units by an authorized testing institute
- conformity assessment of all reports and documents by certification body.

Having completed these steps successfully the manufacturers/distributors receive their certificate – their key to the European market.

The Heat Pump KEYMARK certificate is valid for 10 years. It can be renewed for a further 10 years provided that surveillance shows that the preconditions are met. An updated list of all certificate holders and all technical data sheets of the certified products are published in the Heat Pump KEYMARK database at:

www.heatpumpkeymark.com

Get in touch with a competent certification body. We would gladly assist you.

Testing laboratory and production monitoring

The testing laboratory plays a key role when it comes to product testing and production monitoring. After the performance of required tests according to the KEYMARK document the test report prepared by the testing laboratory serves as the leading document for conformity assessment.

ANSGAR POMP

One of the laboratory's tasks is the initial testing of the devices selected by the certification body. Often, the testing laboratory also supports the selection of the devices to be tested and carries out the first communication with the certified body.

After the practical examination of the defined test points (KEYMARK document annex A chapter 2.2.4), the test center prepares a report for the customer, which is then part of the documentation to be submitted for certifica-



Source: TÜV Rheinland

Testing laboratory.

tion. The practical tests are carried out either in the testing laboratory or in the manufacturer's laboratory. However, the latter must be audited beforehand by the test center and the test facilities must meet the same requirements as an accredited laboratory. All tests are always carried out in the presence of the test center employees. In addition to the initial test, repeat tests are required after two years (KEYMARK document annex A chapter 3.2). The series devices to be tested are selected by the certified body in cooperation with the testing laboratory. Depending on the agreement, these tests are then carried out again in the testing laboratory or manufacturer's laboratory.

PRODUCTION MONITORING PERFORMANCE

Production monitoring can be carried out independently of practical tests. The annual monitoring is carried out for each production site. The items to be tested are listed in the KEYMARK document annex B and C. The manufacturer may contact the certification body auditors. After the audit has been carried out, the auditor prepares a report which is then part of the documents to be submitted for certification.

The "Blue Guide": A contribution for a better understanding of essential EU product rules

The free movement of goods throughout the European Community offers market opportunities for heat pump manufacturers but at the same time involves a jungle of potential legal hurdles.

REINER VERBERT

The "Blue Guide (BG)", intended to contribute to a better understanding of EU product rules, should help market actors apply them in the correct way. A clear definition and the corresponding responsibilities of all EC actors, such as manufacturer, authorized representative, importer, distributor and end-user is provided by the BG. But which legislation covered by a matching directive or regulation is applicable for placing the heat pump on the market? And if once defined, what are

the essential product requirements and which standards represent the so called "state of the art" for the heat pump product? What is the minimum technical documentation required and what are the product marking needs? CE marking and the EU Declaration of conformity DoC must be provided in such a manner that the end-user's and market surveillance authorities' expectations are fulfilled. The DoC becomes an extract of all efforts done by the manufacturer in order to follow the

EU product rules. The "Blue Guide" can provide the manufacturer a kind of recipe book, with extensive information regarding the product placement. The "Blue Guide" is intended as a tool to help manufacturers and others find a path through the product launching jungle. Keep in mind that the final and binding interpretation is solely and exclusively under the jurisdiction in the competence of the Court of Justice of the European Union.

Annex: authors and contact details

Our authors are looking forward to answering your questions.

TÜV Rheinland
Energy GmbH
Am Grauen Stein
51105 Cologne
www.tuv.com

DIN CERTCO Gesellschaft für
Konformitätsbewertung mbH
Alboinstraße 56
12103 Berlin
www.dincertco.de

European Heat Pump
Association AISBL
Rue d'Arlon 63-67
1040 Brussels
www.ehpa.org

Ansgar Pomp
Tel. +49 5973 600297
ansgar.pomp@de.tuv.com

Katharina Vehring
Tel. +49 30 7562-1102
katharina.vehring@dincertco.de

Thomas Nowak
Tel. +49 176 63201140
thomas.nowak@ehpa.org

Mario Reibold
Tel. +49 221 806-1521
mario.reibold@de.tuv.com

Dr. Ina Förster
Tel. +49 30 7562-1104
ina.foerster@dincertco.de

Francesca Corazza
Tel. +32 491 64 93 06
secretariat@heatpumpkeymark.com

Reiner Verbert
Tel. +49 221 806-2525
reiner.verbert@de.tuv.com

TÜV Rheinland Energy GmbH
Am Grauen Stein
51105 Cologne
energy@de.tuv.com

www.tuv.com

