

BLUE ANGEL

The German Ecolabel



Wood Pellet Stoves

DE-UZ 111

Basic Award Criteria

Edition February 2016

Version 2

The Environmental Label is supported by the following four institutions:



The Federal Ministry for the Environment, Nature Conservation and Nuclear Safety is the owner of the label. It regularly provides information on the decisions taken by the Environmental Label Jury.



The German Environmental Agency with its specialist department for "Ecodesign, Eco-Labeling and Environmentally friendly Procurement" acts as office of the Environmental Label Jury and develops the technical criteria of the Basic Criteria for Award of the Blue Angel.



The Environmental Label Jury is the independent, decision-making body for the Blue Angel and includes representatives from environmental and consumer associations, trade unions, industry, the trade, crafts, local authorities, academia, the media, churches, young people and the German federal states.



The RAL gGmbH is the awarding body for the Environmental Label. It organises the process for developing the relevant award criteria in independent expert hearings – which involve all relevant interest groups.

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This document is a translation of a German original. In case of dispute, the original document should be taken as authoritative.

1 Introduction

1.1 Preface

In cooperation with the Federal Ministry for the Environment, Nature Conservation and Nuclear Safety, the German Environmental Agency and considering the results of the expert hearings conducted by RAL gGmbH, the Environmental Label Jury has set up these Basic Criteria for the Award of the Environmental Label. RAL gGmbH has been tasked with awarding the Environmental Label.

Upon application to RAL gGmbH and on the basis of a Contract on the Use of the Environmental Label to be concluded with RAL gGmbH, the permission to use the Environmental Label may be granted to all products, provided that they comply with the requirements as specified hereinafter.

The product must comply with all the legal requirements in the country in which it is to be marketed. The applicant shall declare that the product meets this requirement.

1.2 Background

Their high level of automation and their use of uniform-quality fuels enable wood pellet stoves to make efficient and low-emission use of renewable fuels for heating purposes. Thus, they help protect our climate and reduce the primary energy use of non-renewable energy carriers. There are two methods to determine energy efficiency. Both describe the same level of performance. Applicants may choose one of these two methods:

a) According to the current Commission Regulation (EU) No 2015/1185 on ecodesign.

This first method includes the auxiliary power demand and refers to the calorific value of the fuel used.

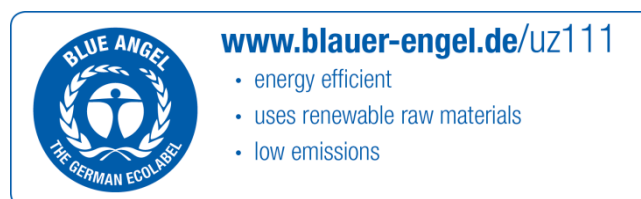
b) According to the current standards. This second method requires the separate determination of efficiency and auxiliary power demand.

In order to improve air quality the emissions from these systems shall be minimized by ambitious limits.

It is explicitly stated that the review of the limits laid down in these Basic Criteria is based on test room measurements under idealized standard conditions. They allow a comparison of the test results and usually differ from field test results.

The above-shown Blue Angel eco-label may be awarded to wood-pellet stoves as specified under Scope which make more efficient use of the fuel used and emit far less pollutants than would be permitted under current standards or legal requirements.

Therefore, following benefits for the environment and health are stated in the explanatory box:



2 Scope

These Basic Criteria apply to wood pellet stoves according to DIN 18894¹ or DIN EN 14785² with a nominal heat output up to and including 15 kW exclusively designed for the use of wood pellets - preferably those complying with DIN EN 14961-2³ (Grade A1), ENplus (Grade A1) or DINplus.

A basic requirement to be met by a Blue Angel eco-labelled appliance is an efficient and low-emission on-site operation. That is why only those appliances will be considered for the award of the Blue Angel eco-label:

- that may only be used with wood pellets to prevent a deterioration of efficiency and emission behaviour if using lower-quality fuels (exclusion of combined appliances)
- where ignition and combustion control are carried out fully automatically in order to avoid malfunctions through improper operation (exclusion of systems with manually operated control units (for example, for lever control of combustion air supply))
- which represent a complete system and, thus, allow the evaluation of the system's efficiency and emissions (exclusion of pellet burners).

3 Requirements and Compliance Verifications

The above Blue Angel eco-label may be awarded to wood pellet stoves under para. 2, provided that they meet the following requirements:

3.1 General Requirements

The applicant shall not only verify compliance with the energy and emission technology requirements hereunder but also with the requirements of DIN 18894¹ or DIN EN 14785² for structural design and safety behaviour (avoidance of critical operating modes during normal and faulty operation, limitation of surface temperatures, automatic switch-off and electrical safety).⁴

3.2 Requirements for Efficient Energy Use

3.2.1 Determination of the Requirements according to Regulation (EU) No 2015/1185

The seasonal space heating energy efficiency (η_s) according to Regulation (EU) No2015/1185 shall be no less than 84%.

The parameters for calculating the seasonal space heating energy efficiency shall be determined in accordance with Appendix 2 to these Basic Criteria and documented in the test report.

The average auxiliary power demand for the ignition process shall be determined and expressed in watt-hours in the test report.

¹ Edition of February 2005

² Edition of October 2007

³ Edition of September 2014

⁴ On the strength of legal bases, other co-applicable EU Regulations must be observed for the marketing of pellet stoves, such as, for example, the EMV Directive (Council Directive 89/336/EEC on the approximation of the laws of the Member States relating to electromagnetic compatibility).

The electric power consumption of the internal power-consuming devices of the wood-pellet stove specified in Appendix 1 to these DE-UZ 111 Basic Criteria (if present) shall be separately recorded in watts.

If the wood-pellet stove is equipped with a water pocket the waterside resistance shall be determined in accordance with DIN 18894⁵ or DIN EN 14785⁶ and recorded in the test report.

3.2.2 Separate Requirements for Efficiency and Auxiliary Power Demand

3.2.2.1 Efficiency

The efficiency shall be determined at nominal load conditions (nominal heat output) as well as at part load conditions (lowest adjustable output).

The efficiency of pellet stoves according to DIN 18894⁵ or DIN EN 14785⁶ shall not fall below 90% at nominal load and part load.

3.2.2.2 Auxiliary Power Demand and Electric Power Consumption

The auxiliary power demand shall be determined in accordance with Appendix 2 to these Basic Criteria.

The auxiliary power demand of *air* pellet stoves shall not exceed 0.8% of the nominal heat output at nominal load and 0.4% of the nominal heat output at part load conditions.

The auxiliary power demand of *hydro* pellet stoves shall not exceed 0.9% of the nominal heat output at nominal load and 0.7% of the nominal heat output at part load conditions.

Systems with an auxiliary power demand of up to and including 50 W shall be exempt from the preceding requirements for auxiliary power demand. In sleep mode (standby without heat generation) the average electric power consumption shall not exceed 5 watts for *air* pellet stoves and 8 watts for *hydro* pellet stoves. The average auxiliary power demand for the ignition process shall be determined and given in watt hours in the test report.

The electric power consumption of the internal power-consuming devices of the pellet stove specified in Appendix 2 to these Basic Criteria DE-UZ 111 (if available) shall be separately recorded in watts.

For pellet stoves with a water pocket the waterside resistance shall be determined in accordance with DIN 18894⁷ or DIN EN 14785⁸ and recorded in the test report.

3.3 Emission Requirements

The emission limits hereunder – related to dry exhaust gas in standard reference condition (0 °C, 1013 mbar) with an oxygen volume content of 13 percent - shall be observed. The measurement unit mg/Nm³ is to be understood as mg of pollutants per standard cubic meter of exhaust gas (mass concentration). Testing shall be done using the measurement methods described in para. 4. The emission values shall be determined at nominal load and part load conditions (lowest adjustable output) as well as for the duration of the ignition process. They shall be recorded in the test report.

⁵ Edition of February 2005

⁶ Edition of October 2007

⁷ Edition of February 2005

⁸ Edition of October 2007

3.3.1 Nitrogen Oxides (NO_x)

The content of nitrogen monoxide and nitrogen dioxide in the exhaust gas (expressed as nitrogen dioxide) shall not exceed 150 mg/Nm³ at nominal load conditions and 200 mg/Nm³ at part load conditions.⁹

3.3.2 Carbon Monoxide (CO)

The carbon monoxide content in the exhaust gas must not exceed 160 mg/Nm³ at nominal load and 250 mg/Nm³ at part load conditions.

3.3.3 Organic Gaseous Carbon (OGC)

The content of gaseous organic carbon (OGC) in the exhaust gas, given as total carbon, shall not exceed 8 mg/Nm³ at nominal load and 13 mg/Nm³ at part load conditions.

3.3.4 Dust

The content of dust in the exhaust gas shall not exceed 15 mg/Nm³ at nominal and part load conditions.

3.4 Setting and Operating Instructions

The Setting Instructions shall include clear and explicit information on how the wood pellet firing system can be properly adjusted by qualified personnel. They shall be clearly labelled as instructions "for qualified personnel". Setting according to the Setting Instructions must ensure an efficient and low-emission operation of the system. The Setting Instructions shall include information on how to match the wood pellet firing and the exhaust gas unit, and – for systems equipped with a water pocket - on how to combine the system with a buffer tank.

The Operating Instructions shall include clear and comprehensible instructions for an environmentally friendly, i.e. efficient and low-emission, operation of the system by the user as well as information on regular system maintenance and cleaning by a specialist company.

The documents shall at least meet the requirements of DIN 18894¹⁰ or DIN EN 14785¹¹. Compliance with DIN EN 62079¹² „Preparation of instructions. Structuring, content and presentation" is recommended.

Compliance Verifications

The applicant shall submit the following documents to establish compliance with the requirements under paras. 3.1 to 3.4:

- *Test report according to Appendix A to the Basic Criteria DE-UZ 111 confirming product compliance with the requirements under paras. 3.1 to 3.4 in combination with para. 4 indicating the measurement methods/instruments used as well as the measurement inaccuracies.*
- *Setting and Operating Instructions providing information according to para. 3.4 as well as the Attachment to the Operating Instructions according to Appendix C to these Basic*

⁹ Based on current knowledge the formation of nitrogen oxides in wood firing systems primarily depends on the nitrogen content of the fuel. Thermal NO_x formation is largely ruled out. There is, however, indication that NO_x emissions can be influenced by combustion engineering measures.

¹⁰ Edition of Februar 2005

¹¹ Edition of October 2007

¹² Edition of November 2001

Criteria including the corresponding page/percent information (If the design of the heating system necessitates changes to the text of paras. 3 and 4 of the Attachment with a view to an efficient and low-emission operation the applicant shall be entitled to make proposals for such changes).

3.5 Services

The environmentally friendly operation of a wood pellet heating system also heavily depends on proper installation and setting of the system, regular maintenance and cleaning of the system as well as on user behaviour. To ensure a permanently efficient and low-emission operation the manufacturer itself or its service partner shall offer specific services in selection, dimensioning and installation of the system as well as during the operation of the system:

- Technical training for fitters and sales personnel
- Advice and offer for the installation of a buffer tank for systems equipped with a water pocket
- Advice on the installation of the exhaust gas equipment
- Submission of an offer for the initial operation of the heat-generating equipment by the manufacturer and explanation of the parameters for an efficient, low-emission combustion as well as explanation of the stove control system (customer training)
- Offer for maintenance services available during regular service hours
- Offer for an annual checking and maintenance of the system
- Availability of equivalent spare parts for at least 10 years following the placing on the market of the system.

3.6 Fuel Quality

The manufacturer undertakes to inform consumers in a proper way about fuel quality requirements as well as about current standards and quality assurance systems.

Possible consequences (especially fusion, loss of warranty, increased emissions) of operating the system using fuels that have not been approved for use in the system or do not have the necessary fuel properties shall be described in an appropriate way.

It shall be pointed out that wood-pellet firing systems in private households may only be fired by use of wood pellets, preferably those meeting the requirements of DIN EN 14961-2¹³ (Grade A1), ENplus (Grade A1) or DINplus.

3.7 Environmentally Responsible Product Design

Unless there is compelling technical reason to the contrary the following principles for "designing recyclable technical products" shall be observed and explained in writing. The checklist "Recyclable Design" under Appendix D to these Basic Criteria shall serve as a basis for checking the individual features.

- Avoidance of non-separable material connections between different materials
- Avoidance of composite materials
- Easy detachability of modules – also for the purpose of easy repair
- Reduction of the variety of materials

¹³ Edition of September 2014

In addition, the manufacturer shall, upon filing the application for award of the Blue Angel eco-label, submit a written declaration of compliance with following requirements:

- Plastic product components greater than 50 grams in weight shall be marked with a symbol or abbreviated term according to DIN EN ISO 1043-1¹⁴ or DIN ISO 1629¹⁵ (rubber) or DIN ISO 2076¹⁶ (chemical fibres). Plastics must not contain heavy metals, phthalates or halogenated flame retardants.

Compliance Verifications

The applicant shall declare compliance with the requirements under paras. 3.6, 3.7 and 3.8 (Manufacturer Declaration according to the "Annex to the Contract").

4 Testing

4.1 Testing Laboratories

Testing shall be conducted by an independent testing laboratory accredited according to DIN EN ISO 17025¹⁷ for the testing of „Heating boilers for solid fuels“ or by a notified body under the EU Construction Products Directive accredited for the testing of space heating appliances fired by wood pellets pursuant to DIN EN 14785¹⁸. Testing shall comprise the complete compliance verifications under paras. 3.1 to 3.5.

4.2 Test Methods

Measurements shall be taken at nominal load (nominal heat output) and part load (lowest adjustable output). The measurement of all necessary values (efficiency, auxiliary power demand and emissions) shall - if technically possible - be conducted in a single session (exclusion of measurements of individual parameters using system settings optimized for this particular parameter).

Testing, especially the verification of compliance with the efficiency and emission requirements under paras. 3.2 and 3.4, shall be conducted in accordance with DIN 18894¹⁹ or DIN EN 14785²⁰. Dust, nitrogen oxides and OGC emissions shall be additionally measured using the measurement method under CEN/TS 15883: 2009 taking into account a reference oxygen content of 13%. The dust measurement shall be conducted in accordance with CEN/TS 15883: 2009, Annex A.1. A minimum of three measurements shall be taken.

Wood pellets according to DIN EN 14961-2²¹ (Grade A1), ENplus (Grade A1) or DINplus should preferably be used as fuel for the measurements of toxic substance emissions. Prior to this, these wood pellets shall be subjected to an elemental analysis including determination of the calorific value.

¹⁴ Edition of June 2002

¹⁵ Edition of November 2004

¹⁶ Edition of May 2001

¹⁷ Edition of September 2014

¹⁸ Registered under <http://ec.europa.eu/enterprise/newapproach/nando/index.cfm?fuseaction=cpd.hs>

¹⁹ Edition of February 2005

²⁰ Edition of September 2006

²¹ Edition of July 2010 (draft standard)

4.3 Calibration Gases and Measuring Instruments

Certified calibration gases shall be used for the calibration of the measuring equipment. The use of calibration gas generators shall not be permitted. Measuring instruments shall be used in accordance with DIN 18894¹⁹, DIN EN 14785²⁰, or CEN/TS 15883: 2009. A heated measuring line shall be used for measuring the nitrogen oxide content.

5 Applicants and Parties Involved

Distributors of final products according to para. 2 shall be eligible for application.

Parties involved in the award process are:

- RAL gGmbH to award the Blue Angel Environmental Label,
- the federal state being home to the applicant's production site,
- Umweltbundesamt (German Environmental Agency) which after the signing of the contract receives all data and documents submitted in applications for the Blue Angel in order to be able to further develop the Basic Award Criteria.

6 Use of the Environmental Label

The use of the Environmental Label by the applicant is governed by a contract on the use of the Environmental Label concluded with RAL gGmbH.

Within the scope of such contract, the applicant undertakes to comply with the requirements under Paragraph 3 while using the Environmental Label.

Contracts on the Use of the Environmental Label are concluded to fix the terms for the certification of products under Paragraph 2. Such contracts shall run until December 31, 2022. They shall be extended by periods of one year each, unless terminated in writing by March 31, 2022 or March 31 of the respective year of extension.

After the expiry of the contract, the Environmental Label may neither be used for labelling nor for advertising purposes. This regulation shall not affect products being still in the market.

The applicant (manufacturer) shall be entitled to apply to RAL gGmbH for an extension of the right to use the ecolabel on the product entitled to the label if it is to be marketed under another brand/trade name and/or other marketing organisations.

The Contract on the Use of the Environmental Label shall specify:

- Applicant (distributor)
- Brand/trade name, product description
- Distributor (label user), i.e. the above-mentioned marketing organisations.

Appendix A Test report

Available on a separate document

Appendix B Measurement of the Auxiliary Power Demand in Different Operating Modes

The point of fuel supply shall be used as system boundary for determining the auxiliary power demand.

a) Auxiliary Power Demand in the Operating State

The objective of measuring the auxiliary power demand in the operating state is to determine the pellet stove's electric power consumption at nominal load and part load conditions (lowest adjustable output).

For this purpose, the system's electric energy consumption (without taking into account the heating-water circulating pump and a possibly existing fuel conveyor system) is to be determined over a measuring time of at least 1 hour pursuant to DIN 18894²² or DIN EN 14785²³ for the heating equipment testing and shall be given in watts - based on the measuring time - as average electric power consumption in relation to the nominal heat output.

If the pellet stove is equipped with a convection fan that can be switched off by the user the auxiliary power demand requirements in para. 3.2 of the Basic Criteria refer to the operation with the fan switched off. A subsequent calculated correction of the auxiliary power demand shall be permitted for devices that have been tested prior to the publication of these Basic Criteria. The auxiliary power demand of the convection fan shall be separately given in watts.

b) Auxiliary Power Demand in Sleep Mode (Standby without Heat Generation)

The objective of measuring the auxiliary power demand in sleep mode is to determine the electric power consumption of the pellet stove when there is no heat demand and when only electrical consumers are turned on to maintain operation readiness.

For this purpose, the system's electric energy consumption is to be measured over a period of at least 10 minutes. This measuring time may have to be extended if control processes have an impact on the system's own electric power consumption. The energy consumption determined shall be given in watts - based on the measuring time - as average electric power consumption and related to the nominal heat output.

c) Auxiliary Power Demand for the Ignition Process

The auxiliary power demand of the ignition device shall be determined during the ignition process and expressed as electric work in watt hours.

d) Electric Power Consumption of Central Consumers

The electric power consumption of the following internal power-consuming devices of the pellet stove (if available) shall be separately given in watts:

- ♦ Fan motor(s),
- ♦ Heat exchanger cleaning motor(s),
- ♦ Ash removal motor(s) and fuel auger motor(s).

²² Edition of February 2005

²³ Edition of September 2006

If the system is equipped with a fuel conveyor system (mechanical or pneumatic conveyor) the electric power consumption of the motors shall be recorded.

e) Waterside Resistance and Circulating Pump

The waterside resistance shall be determined in accordance with DIN 18894²⁴ or DIN EN 14785²⁵. If the wood-pellet stove is equipped with a heating water circulating pump its auxiliary power demand (minimum/maximum values) shall be recorded in the test report. These values shall be accompanied by information on the type of pump control system (multi-stage including the number of pump output levels or automated control with indication of the control range in percent).

²⁴ Edition of February 2005

²⁵ Edition of September 2006

Appendix C Attachment to the Operating Instructions

Attachment to the Operating Instructions
Company ...

Dear Customer!

To ensure an efficient and low-emission operation of your heating system please read the following carefully:

- Do not use fuels other than those specified by us in the Operating Instructions (page ...). Only this way can we guarantee a low-emission, economic and trouble-free operation of your heating system.
- We recommend regular inspection and cleaning of the heating system. For further information please see the Operations Instructions (page ...). This ensures not only the functional safety of the heating system and its safety devices but also the system's energy-efficient and low-emission operation. For optimum servicing of your heating system we recommend a maintenance contract.
- Your pellet stove offers a variable range of heat output from ...% to% of the nominal heat output. The appliances should preferably be operated at medium to high output levels (adjusted to the respective heat demand) in order to avoid unnecessary emissions in low-load operation. The ideal is the combination with a modulating room or heating thermostat in order to avoid unnecessary clocking and to achieve the longest possible operating times.

Applies only to Products with Internal Heat Exchanger:

- From an energetic point of view, a buffer tank and the combination with a solar plant would be recommendable. This would ensure an energy-efficient and low-emission operation of your heating system.

Appendix D Checklist „Recyclable Design“

This checklist is divided into the following requirement sections:

A. Structure and Connection Technology

B. Material Selection and Marking

C. Disassembly

A, B, C	Requirement	The requirement is met?	
		Yes	No

A. Structure and Connection Technology

A1	Can modules made of materials incompatible with each other be separated as such or are they connected via separation aids or can all materials used be separated by means of processing technologies.	Yes	No
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This concerns all connections between modules. Adhesive labels (e.g. company logos and labels) are concerned as well. The term "separation aids" stands, for example, for predetermined breaking points.

A2	Can modules that potentially contain hazardous substances (e.g. control) be easily detached from the pellet stove?	Yes	No
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Electric modules as well as measurement and control equipment should be easy to identify and separate.

B. Material Selection and Marking

B1	Is the variety of plastic materials performing comparable functions limited to a single polymer or polymer blend?	Yes	No
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The smaller the number of plastics used the more efficient are separation and sorting processes.

B2	Are components made of the same sort of plastic dyed uniformly or compatibly?	Yes	No
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"Compatible dyeing" refers to different shades of one colour (e.g. grey and anthracite). If, in addition, different types of plastics exhibit different colours, such "colour coding" would be useful for a safe type-specific separation of plastics.

B3	Is the coating of plastic components limited to the necessary minimum?	Yes	No
----	--	-----	----

Large-surface paint coats, vapour depositions and printings on plastic components necessitate additional removal processes to ensure material-specific recycling. Markings for material identification or disassembly instructions shall not be considered as printings.

B4	Do the materials and material compounds used allow high-level material-specific recycling?	Yes	No
----	--	-----	----

Materials allowing material-specific recycling are those materials that can be recycled on an industrial scale, i.e. where recycling would be useful from a technological and economic point of view. This is taken for granted with respect to steel and stainless steel.

B5	Do the plastics used allow a proportionate use of recyclates and does the product specification permit such proportionate use? Please note: This must not result in a shortening of the service life.	Yes	No
----	---	-----	----

A closed loop of materials won't exist until recyclates are actually used.

B6	Are the plastics marked in accordance with ISO 11469?	Yes	No
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The marking of plastics enables all recycling companies to sort plastics by type.

B7	Has the product been manufactured without the use of plastic additives and colour pigments containing Pb or Cd?	Yes	No
----	---	-----	----

C. Disassembly

C1	Will it be easy to identify and separate modules that may contain hazardous substances?	Yes	No
----	---	-----	----

Components that are likely to contain hazardous substances must - as a minimum requirement for recyclable design - be easy to discover and separate.

C2	Will it be easy to identify connections that need to be separated?	Yes	No
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Connections that need to be separated during disassembly should be easy and quick to discover. If they are concealed appropriate instructions should be noted on the product.

C3	Can disassembly for the purpose of recycling be achieved by the exclusive use of general-purpose tools?	Yes	No
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The term „general-purpose tool“ stands for conventional commercial tools. Exempted are connections where mandatory provisions have an influence on the choice of connection technology.