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Certificate No EUFI29-19003115-C/EN
Issued 27.5.2019

# PRODUCT CERTIFICATE

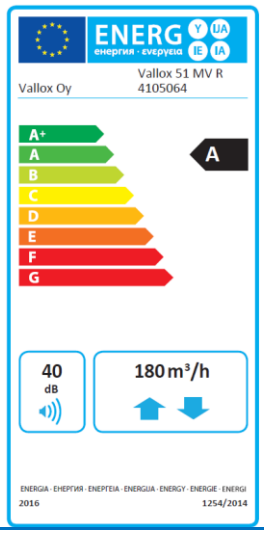
## Vallox Oy

manufactures

### ventilation units Vallox 51 MV

Vallox 51 MV is intended to be used as a ventilation unit of a dwelling. The ventilation unit complies with the eco-design requirements of specific energy consumption in average climate and other requirements defined in Commission Regulation (EU) No 1253/2014. Efficiency of heat recovery and specific electrical power in Finnish climate and thermal, aerodynamic and acoustic characteristics have been defined according to the certification criteria *SERT R018: Ventilation unit of a dwelling*. The energy label of a ventilation unit in average climate of Europe according to Commission delegated Regulation (EU) No 1254/2014 and a summary of the calculated energy efficiency of the ventilation unit in the weather conditions of Southern Finland is presented in the following:

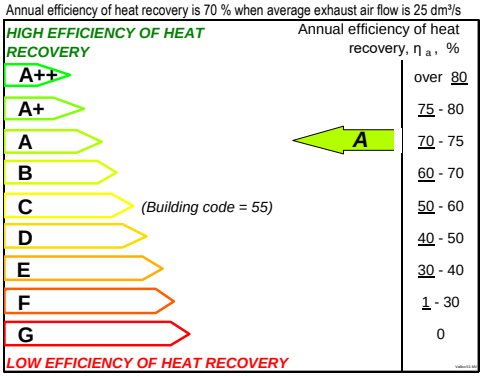
**EU ENERGY LABEL**
**Energy efficiency is indicated for the average climate**

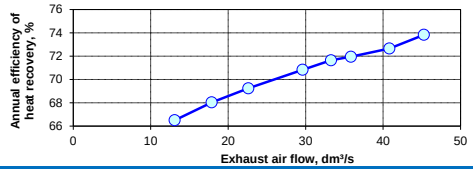



**Heat recovery and specific electrical power in the weather conditions of Southern Finland**

**ANNUAL EFFICIENCY OF HEAT RECOVERY, $\eta_a$**

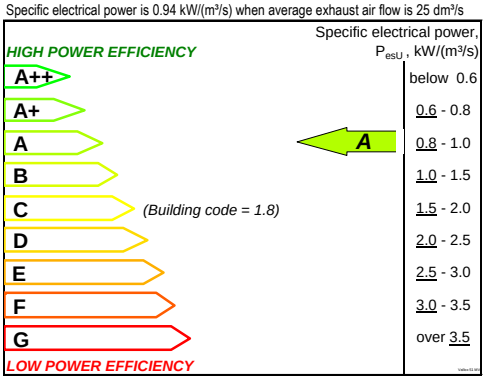
Annual efficiency of heat recovery is 70 % when average exhaust air flow is 25 dm³/s

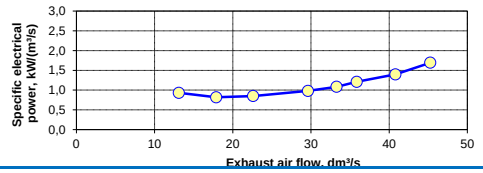



**SPECIFIC ELECTRICAL POWER, $P_{esU}$**

Specific electrical power is 0.94 kW/(m³/s) when average exhaust air flow is 25 dm³/s




The ventilation unit meets the requirements presented on page 3. The product information of the ventilation unit, the source data and the results of the energy efficiency calculation are presented in an appendix of the certificate. This certificate is valid until May 26, 2024 on condition that the product is not essentially changed and that the manufacturer has a valid quality assurance agreement and contract on certification with Eurofins Expert Services Oy. The validity of the certificate can be checked with Eurofins Expert Services Oy or on the Internet at https://sertifikaattihaku.fi/en. Other conditions are listed on the page 2 of the certificate.

Espoo May 27, 2019

Tiina Ala-Outinen
Business Unit Manager

Mikko Saari
Auditor

*This document has been signed electronically*

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Conditions of the validity of the certificate:

Where reference is made in this certificate to any regulations, publications, standards or other documents, it shall be construed as a reference to such publication in the form of which it is in force at the date of this certificate.

The manufacturer is responsible for the quality and continuous quality control of the product. In granting this certificate, Eurofins Expert Services Oy does not accept responsibility to any person or body for any loss or damage incurred in respect of personal injury arising as direct or indirect result of the use of this product.

The use of the name of Eurofins Expert Services Oy or the name Eurofins in any form in advertising or distribution in part of this certificate is only permissible with written authorisation from Eurofins Expert Services Oy.

This certificate is the English version of the original EUFI29-19003115-C Finnish certificate. In case of dispute, the Finnish original of the certificate is valid.

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# PRODUCT CERTIFICATE

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The certified ventilation unit of a dwelling meets the requirements presented below.

| Property | Determination method | Requirement | Result |
|---|---|---|---|
| Leakage | EN 13141-7 Annex B | Decree 1009/2017 and guideline [1)] | Meets the requirement |
| Air filter by-pass leakage | EN 1886 | EN 1886 [2)] | Meets the requirement |
| Aerodynamic performance (pressure / air flow) | EN 308, EN 13141-7 | Manufacturer declares | The measured values correspond to the values declared by the manufacturer |
| Acoustic performance | ISO 3741, ISO 5135, EN 13141-7 | Manufacturer declares | The measured values correspond to the values declared by the manufacturer |
| Temperature ratio (excl. fan power) | EN 308, EN 13141-7 | ≥ 65 % | Meets the requirement |
| Operation at low outdoor air temperatures | EN 308, EN 13141-7 | Operation approved at outdoor air temperature +5 … -20 °C [3)] | Meets the requirement |
| Specific electrical power | EN 308, EN 13141-7 | Decree 1010/2017 [4)] | Meets the requirement |
| Annual efficiency of the heat recovery of exhaust air | Handout 122/2003 from the ministry of the Environment | ≥ 55 %<br>decree 1010/2017 [5)] | Meets the requirement |
| Performance characteristics required in the the energy label (table 1 and 2) | Commission Regulation (EU) No 1253/2014 | Commission Regulation (EU) No 1253/2014 [6)] | Meets the requirement. Checked/ measured values correspond to the values declared by the manufacturer |
| Installation and maintenance guidelines, user manual | Inspection and assessment | Decree 1009/2017, 8 §, Act 132/1999, 117 i § | Meets the requirement |

Requirements:

1) Leakage: Leakage class A of the casing (decree 1009/2017, 19 §), leakage air flow rate between the supply and exhaust air sides at most 6 % of the nominal air flow rate of the air supply unit at a test pressure of 300 Pa (Indoor climate and ventilation guideline, www.talotekniikkainfo.fi).
2) Air filter by-pass leakage: Accepted by-pass leakage is 2 % of the declared maximum air flow. The test pressure is double the pressure drop of the clean air filter at the declared maximum air flow ($ePM_1$ = 50 - 65 %).
3) Operation at low outdoor air temperatures (+5 … -20 °C): The freezing protection and the removal of water condensing from exhaust air have been implemented reliably. Freezing or freezing protection does not reduce ventilation or produce harmful pressure difference over the building envelope. Acceptable reduction for averaged air flow rate is normally at most 10 %, and not more than 20 %. Supply air temperature should be normally at least +10 °C. The test conditions include both dry (relative humidity is 20 %) and moist (35 %) extract air.
4) Specific electrical power: At most 1.8 W/(dm³/s) (decree 1010/2017, 30 §). Requirement of the structural energy efficiency will be fulfilled if value is at most 1.5 W/(dm³/s) (decree 1010/2017, 33 §).
5) Annual efficiency of the heat recovery of exhaust air: At least 55 % (decree 1010/2017, 26 §, reference value). Requirement of the structural energy efficiency will be fulfilled if value is at least 65 % (decree 1010/2017, 33 §). Calculation is made for pressurized exhaust air ductwork system 10 x dynamic pressure in duct joint for average flow, at least 50 Pa (25 Pa steps, rounded downwards). Supply air is 95 % of exhaust air flow rate. On a daily basis, increased air flow (at least 130 %) shall be used at least two hours, reduced air flow rate (at least 40 %) shall not be used more than 8 hours. Other operation times are controlled so that the average air flow rate is reached. The empirically determined minimum exhaust air temperature is used as a set point for freezing protection. Applicable lowest temperature for demand controlled freezing protection is calculated as a weighted mean of moist (25 % of time) and dry extract air (75 % of time) condition.
6) Eco-design requirements from 1.1.2018 (Commission Regulation (EU) No 1253/2014)
   In average climate condition specified energy consumption (SEC) is not more than -20 kWh/(m², a)
   Air handling unit is equipped with a multi-speed drive or variable speed drive
   Air handling unit is equipped with a thermal by-pass facility
   Air handling unit is equipped with a visual filter change warning signal.

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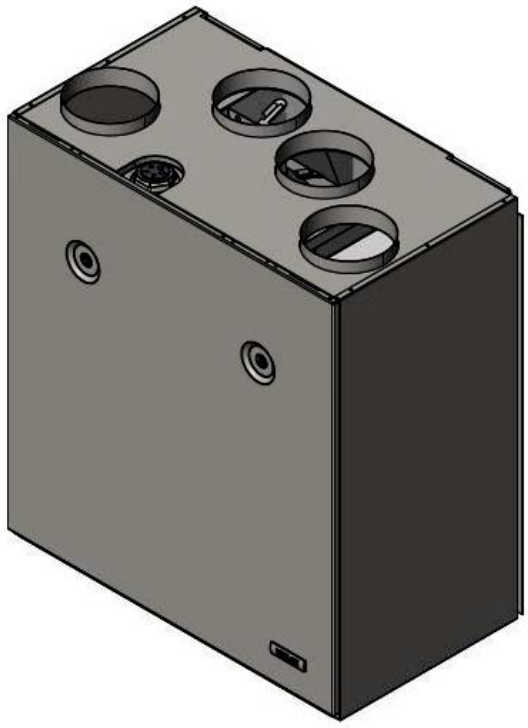
**Product information and calculation of energy efficiency for the ventilation unit of a dwelling**

**Product information:**

Model: Vallox 51 MV
Manufacturer and representative of the device: Vallox Oy, Myllykyläntie 9 - 11, FI-32200 Loimaa, Finland. Tel +358 10 7732 200, www.vallox.com
Outer dimensions: 598 mm (width) x 668 mm (height) x 349 mm (depth)
Weight: 60 kg
Air duct connections: four connections from the top of the unit, duct diameter 125 mm
Electrical connection: 230 V, 10 A, AC-plug connector
Fans: direct current fans, 2 x 35 W, integrated power control
Control of air flows: MyVallox control, profiles: home-away-boost, each control setting can be chosen freely within the predefined operating range.
Air filter: outdoor air ISO coarse ≥ 75 % + ISO $ePM_1$ 50 %, exhaust air ISO coarse ≥ 75 %
Heat recovery (HR): counter-cross-flow plate heat exchanger
Method of avoiding freezing of the (HR): demand controlled defrosting based on temperature measurements. The defrosting is carried out by bypassing HR on the supply air side. If supply air temperature is too cold during the bypass mode, the air flow rates will be reduced.
Heaters: after-heating of supply air: electrical resistance of 0.9 kW.



# PRODUCT CERTIFICATE



*Table 1. Energy label information and basic data for SEC-value evaluation, which are based on features and performance characteristics of the ventilation unit.*

| **SEC calculation parameters** | | |
|---|---|---|
| CTRL | Ventilation control factor<br>Manual control = 1<br>Clock control = 0.95<br>Central demand control (one sensor) = 0.85<br>Local demand control (at least two sensors) = 0.65 | 0.85 |
| x | Fan motor drive control exponent<br>On/Off, 1-speed = 1<br>2-speed = 1.2<br>Multi-speed = 1.5<br>Variable speed (freq. converter) = 2 | 2 |
| **Measured performance characteristics of the ventilation unit** | | |
| SPI | Specific power input,<br>ratio between the effective power input and the reference flow rate | 0.26 W/(m³/h) |
| P | Electric power input of the fan drive at maximum air flow rate | 76 W |
| $\eta_t$ | Thermal efficiency of heat recovery | 83 % |
| $L_{WA}$ | Sound power level | 40 dB |
| $q_{maximum}$ | Maximum air flow rate (~100 Pa) | 180 m³/h |
| $q_{reference}$ | Reference air flow rate (~50 Pa) | 0.035 m³/s |
| $\Delta p_{reference}$ | Reference pressure difference | 50 Pa |
| | Maximum internal leakage rate | 4.6 % |
| | Maximum external leakage rate | 3.3 % |
| | Carry-over in a regenerative heat exchanger | - % |

*Table 2. Verified results of energy label calculation in different climate types.*

| **Calculation result** | | Climate type | | |
|---|---|---|---|---|
| | | **Average** | Warm | Cold |
| SEC | Specific energy consumption for ventilation per m² heated floor area, kWh/(m² a) | **-38.069** | -14.195 | -75.158 |
| SEC-class | Specific energy consumption class | **A** | - | - |
| AEC | Annual electricity consumption, kWh/(m² a) | **2.803** | 2.353 | 8.173 |
| AHS | Annual heating saved, kWh/(m² a) | 44.402 | 20.078 | 86.861 |

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# PRODUCT CERTIFICATE



## Ventilation unit Vallox 51 MV Southern Finland

### Source data for calculation of energy efficiency of the ventilation unit

| | | |
|---|---|---|
| Climate | Helsinki test year TRY 2012 | |
| Dimensioning temperature of outdoor air | -26 | °C |
| Average temperature of outdoor air (heating period) | 1.0 | °C |
| Exhaust air temperture | 21 | °C |
| Set point of supply air heater | 15 | °C |
| Maximum supply air temperature (limitation) | no limitation | |
| Minimum temperature of exhaust air (freezing protection of HR [1] | -2.0 | °C |
| Maximum outdoor air temperature for heating | 12 | °C |
| Average exhaust air flow rate | 25 | dm³/s |

[1)] HR = heat recovery

**Measured source data of the ventilation unit in calculation**

| Time of use | Set point | Total pressure of the unit (supply) | Supply air flow rate | Total pressure of the unit (exhaust) | Exhaust air flow rate | Air flow ratio (supply/exhaust) | Electrical power | Temperature ratio of supply air in HR |
|---|---|---|---|---|---|---|---|---|
| | | Pa | dm³/s | Pa | dm³/s | % | W | % |
| 0.0 h/day | 100 % | 112 | 45 | 164 | 45 | 99 | 77 | 78 |
| 0.0 h/day | 70 % | 86 | 39 | 133 | 41 | 96 | 57 | 78 |
| 0.0 h/day | 59 % | 64 | 34 | 103 | 36 | 95 | 43 | 78 |
| 2.0 h/day | 53 % | 55 | 31 | 89 | 33 | 94 | 36 | 78 |
| 10.6 h/day | 45 % | 42 | 28 | 70 | 30 | 93 | 29 | 78 |
| 3.4 h/day | 30 % | 23 | 20 | 41 | 23 | 90 | 19 | 78 |
| 8.0 h/day | 20 % | 14 | 16 | 26 | 18 | 88 | 15 | 79 |
| 0.0 h/day | 10 % | 7 | 11 | 14 | 13 | 83 | 12 | 81 |

**Calculation method**
A calculation method based on outdoor temperature duration curve
according to the guidelines of the Ministry of the Environment (no 106 and no 122).
Eurofins calculation model LTOCALC.

### Results of the calculation of the energy efficiency of the ventilation unit

**Calculated energy demand of ventilation, kWh per year**

| | | | |
|---|---|---|---|
| Heating energy demand of ventilation without heat recovery | 3 731 | kWh/a | 100 % |
| Heating energy demand of ventilation with heat recovery | 1 118 | kWh/a | 30 % |
| Thermal energy recovered from exhaust air | 2 614 | kWh/a | **70 %** |
| Energy consumption of the supply air heater | 81 | kWh/a | |
| Electricity consumption of the ventilation unit (excluding heating) | 205 | kWh/a | |

| | | |
|---|---|---|
| **Annual efficiency of the heat recovery of exhaust air, $\eta_a$** | **70** | **%** |
| **Specific electrical power of the ventilation unit** | **0.94** | **kW/(m³/s)** |
| **Coefficient of performance 1 kWh of electricity produces** | **12.8** | **kWh heating energy** |

The actual energy consumption and the annual efficiency of the heat recovery depend on use and the climate.

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## Ventilation unit Vallox 51 MV Central Finland

### Source data for calculation of energy efficiency of the ventilation unit

| | | |
|---|---|---|
| Climate | Jyväskylä test year TRY 2012 | |
| Dimensioning temperature of outdoor air | -32 | °C |
| Average temperature of outdoor air (heating period) | -0.1 | °C |
| Exhaust air temperture | 21 | °C |
| Set point of supply air heater | 15 | °C |
| Maximum supply air temperature (limitation) | no limitation | |
| Minimum temperature of exhaust air (freezing protection of HR [1] | -2.0 | °C |
| Maximum outdoor air temperature for heating | 12 | °C |
| Average exhaust air flow rate | 25 | dm³/s |

[1)] HR = heat recovery

**Measured source data of the ventilation unit in calculation**

| Time of use | Set point | Total pressure of the unit (supply) | Supply air flow rate | Total pressure of the unit (exhaust) | Exhaust air flow rate | Air flow ratio (supply/exhaust) | Electrical power | Temperature ratio of supply air in HR |
|---|---|---|---|---|---|---|---|---|
| | | Pa | dm³/s | Pa | dm³/s | % | W | % |
| 0.0 h/day | 100 % | 112 | 45 | 164 | 45 | 99 | 77 | 78 |
| 0.0 h/day | 70 % | 86 | 39 | 133 | 41 | 96 | 57 | 78 |
| 0.0 h/day | 59 % | 64 | 34 | 103 | 36 | 95 | 43 | 78 |
| 2.0 h/day | 53 % | 55 | 31 | 89 | 33 | 94 | 36 | 78 |
| 10.6 h/day | 45 % | 42 | 28 | 70 | 30 | 93 | 29 | 78 |
| 3.4 h/day | 30 % | 23 | 20 | 41 | 23 | 90 | 19 | 78 |
| 8.0 h/day | 20 % | 14 | 16 | 26 | 18 | 88 | 15 | 79 |
| 0.0 h/day | 10 % | 7 | 11 | 14 | 13 | 83 | 12 | 81 |

**Calculation method**
A calculation method based on outdoor temperature duration curve
according to the guidelines of the Ministry of the Environment (no 106 and no 122).
Eurofins calculation model LTOCALC.

### Results of the calculation of the energy efficiency of the ventilation unit

**Calculated energy demand of ventilation, kWh per year**

| | | | |
|---|---|---|---|
| Heating energy demand of ventilation without heat recovery | 4 363 | kWh/a | 100 % |
| Heating energy demand of ventilation with heat recovery | 1 341 | kWh/a | 31 % |
| Thermal energy recovered from exhaust air | 3 022 | kWh/a | **69 %** |
| Energy consumption of the supply air heater | 138 | kWh/a | |
| Electricity consumption of the ventilation unit (excluding heating) | 205 | kWh/a | |

| | | |
|---|---|---|
| **Annual efficiency of the heat recovery of exhaust air, $\eta_a$** | **69** | **%** |
| **Specific electrical power of the ventilation unit** | **0.94** | **kW/(m³/s)** |
| **Coefficient of performance 1 kWh of electricity produces** | **14.8** | **kWh heating energy** |

The actual energy consumption and the annual efficiency of the heat recovery depend on use and the climate.

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## Ventilation unit Vallox 51 MV Northern Finland

### Source data for calculation of energy efficiency of the ventilation unit

| | | |
|---|---|---|
| Climate | Sodankylä test year TRY 2012 | |
| Dimensioning temperature of outdoor air | -38 | °C |
| Average temperature of outdoor air (heating period) | -2.6 | °C |
| Exhaust air temperture | 21 | °C |
| Set point of supply air heater | 15 | °C |
| Maximum supply air temperature (limitation) | no limitation | |
| Minimum temperature of exhaust air (freezing protection of HR [1] | -2.0 | °C |
| Maximum outdoor air temperature for heating | 12 | °C |
| Average exhaust air flow rate | 25 | dm³/s |

[1)] HR = heat recovery

**Measured source data of the ventilation unit in calculation**

| Time of use | Set point | Total pressure of the unit (supply) | Supply air flow rate | Total pressure of the unit (exhaust) | Exhaust air flow rate | Air flow ratio (supply/exhaust) | Electrical power | Temperature ratio of supply air in HR |
|---|---|---|---|---|---|---|---|---|
| | | Pa | dm³/s | Pa | dm³/s | % | W | % |
| 0.0 h/day | 100 % | 112 | 45 | 164 | 45 | 99 | 77 | 78 |
| 0.0 h/day | 70 % | 86 | 39 | 133 | 41 | 96 | 57 | 78 |
| 0.0 h/day | 59 % | 64 | 34 | 103 | 36 | 95 | 43 | 78 |
| 2.0 h/day | 53 % | 55 | 31 | 89 | 33 | 94 | 36 | 78 |
| 10.6 h/day | 45 % | 42 | 28 | 70 | 30 | 93 | 29 | 78 |
| 3.4 h/day | 30 % | 23 | 20 | 41 | 23 | 90 | 19 | 78 |
| 8.0 h/day | 20 % | 14 | 16 | 26 | 18 | 88 | 15 | 79 |
| 0.0 h/day | 10 % | 7 | 11 | 14 | 13 | 83 | 12 | 81 |

**Calculation method**
A calculation method based on outdoor temperature duration curve
according to the guidelines of the Ministry of the Environment (no 106 and no 122).
Eurofins calculation model LTOCALC.

### Results of the calculation of the energy efficiency of the ventilation unit

**Calculated energy demand of ventilation, kWh per year**

| | | | |
|---|---|---|---|
| Heating energy demand of ventilation without heat recovery | 5 297 | kWh/a | 100 % |
| Heating energy demand of ventilation with heat recovery | 1 815 | kWh/a | 34 % |
| Thermal energy recovered from exhaust air | 3 482 | kWh/a | **66 %** |
| Energy consumption of the supply air heater | 409 | kWh/a | |
| Electricity consumption of the ventilation unit (excluding heating) | 205 | kWh/a | |

| | | |
|---|---|---|
| **Annual efficiency of the heat recovery of exhaust air, $\eta_a$** | **66** | **%** |
| **Specific electrical power of the ventilation unit** | **0.94** | **kW/(m³/s)** |
| **Coefficient of performance 1 kWh of electricity produces** | **17.0** | **kWh heating energy** |

The actual energy consumption and the annual efficiency of the heat recovery depend on use and the climate.