



# TECHNICAL CERTIFICATION RULES OF THE EUROVENT CERTIFIED PERFORMANCE MARK



## VARIABLE REFRIGERANT FLOW SYSTEMS

Identification: ECP-15 VRF

Revision 5 – 01/12/2024

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The purpose of this Technical Certification Rules is to prescribe procedures for the operation of the Eurovent Certified Performance (ECP) certification programme for VARIABLE REFRIGERANT FLOW SYSTEMS (VRF), in accordance with the Certification Manual. In addition to the provisions laid down in the Certification Manual, all the requirements in this document apply

**Modifications as against last version:**

<b>No.</b>	<b>Modifications</b>	<b>Section</b>	<b>Page</b>
1	<i>Sentences modifications or section addition to clarify existing requirements</i>	<i>Various</i>	<i>Various</i>
2	<i>Replacing "High Ambient" by "desert certification"</i>	<i>Various</i>	<i>Various</i>
3	<i>Adding the publication of the plants on the OEM certificates</i>	<i>III.1.1.1</i>	<i>11</i>
4	<i>MVF calculations</i>	<i>Appendix C</i>	<i>33</i>
5	<i>Campaign schedule</i>	<i>Appendix F</i>	<i>36</i>
6	<i>Replacing "after test measurements" for "Unit check"</i>	<i>Various</i>	<i>Various</i>
7	<i>Changing the % of BMG tested as per committee decision</i>	<i>III.1.4</i>	<i>14-15</i>
8	<i>Adding "if possible" for the order of the points tested</i>	<i>III.1.4.4</i>	<i>18</i>
9	<i>Removing the testing of other part load if the capacity ratio is not meet</i>	<i>III.1.4.7</i>	<i>19</i>
10	<i>Changing the response time from 3 hours to 2 days</i>	<i>III.1.4.7</i>	<i>19</i>
11	<i>Adding the explanation about the Rerate of COP at T<sub>biv</sub> and associated PL when it is the exact same point (same temperature and same % of part load)</i>	<i>III.1.4.8</i>	<i>21</i>
12	<i>Scrapping protocole</i>	<i>III.1.4.10</i>	<i>24</i>
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# I. GENERAL INFORMATION

## I.1. Scope

The purpose of this manual is to prescribe procedures for the operation of the Eurovent Certified Performance (ECP) certification programme for VARIABLE REFRIGERANT FLOW (VRF), in accordance with the Certification Manual.

Participation in this programme is open to:

- Original Equipment Manufacturers (OEM)
- Brand Name Manufacturers (BN) selling products already certified by OEM
- Distributors purchasing and selling products non-certified by OEM

### I.1.1. General

The Programme scope is divided in three type of products :

- Air-sourced VRF systems (Mandatory)
- Water-sourced VRF systems (Optionnal)
- Desert certification VRF systems (Optionnal – the certify-all does not apply to this option. The participant can declare only desert certification products)

Are included in the VRF scope:

- Single module VRF outdoor units, multi-split  $\leq 12$  kW or split, declared and published as combination of outdoor and indoor units
- Single module VRF outdoor units, multi-split, with a cooling capacity above 12kW declared and published as an outdoor units;
- Declared optional Water-cooled units
- Heat recovery units are included in the scope, but the heat recovery function is not certified.
- Desert certification systems are included in the scope as an option (not sold on the European market) as a combination of an outdoor and indoor unit(s)

Are excluded from the VRF scope:

- Multiple module outdoor units
- VRF systems above 12 kW with data declared and published as combinations of outdoor(s) and indoor(s) units.
- Units over 12 kW, sold on the European Market, not fulfilling the requirements of commission Regulation (EU) 2016/2281.
- Units under or equal to 12 kW, sold on the European Market, not fulfilling the requirements of Commission regulation (EU) No. 206/2012;

The maximum of indoors units depending on the capacity of the outdoor units, are given in the table:

**Table 1 : Maximum of indoor units depending on the capacity<sup>1</sup>**

Capacity	Number of connected indoor units			
	Ducted horizontal	Cassette	Wall mounted	Ceiling suspended
<b>P <math>\leq</math> 12kW (in both modes)</b>	2	2	/	/
<b>12 (in one mode) &lt; P &lt; 30 kW (in both modes)</b>	4	4	/	/
<b>30 (in one mode) <math>\leq</math> P &lt; 50 kW (in both modes)</b>	6	6	6	6
<b>50 (in one mode) <math>\leq</math> P <math>\leq</math> 100 kW (in both modes)</b>	8	8	8	8

<sup>1</sup> The modes are defined by: cooling and heating at standard rating conditions. "in one mode" can be either of them

## I.1.2. Certify-all principle

Whenever a company participates in the VRF Programme, all production models that are promoted by the applicant/participant/applicant to end-users, specifiers, trading companies, contractors by all means shall be certified, in accordance with this Technical Certification Rules. This includes all models in modular ranges. For the VRF programme, the certify-all requirement as defined in the Certification Manual is applicable.

For the desert certification products, the certify-all does not apply. Therefore, it is entirely up to the participant to choose which units to declare

## I.2. Certified and published performances

The performances that are certified and published are the following:

**Table 2: Certified and published performances**

	Unit	VRF Programme	
		Cert. Perf	Web
<b>EN 14511:2022</b>			
<b>Standard Cooling/Cooling PL Cond A</b>			
<i>Pc (Total Cooling Capacity at standard conditions / Part Load condition A @ 35°C)</i>	kW	YES	YES
<i>Pec (Electric Power Input at standard conditions / Part Load condition A @ 35°C)</i>	kW	YES	YES
<i>EER (Energy Efficiency Ratio at standard conditions / Part Load condition A @ 35°C)</i>		YES	YES
<b>Standard Heating</b>			
<i>Ph (Total heating capacity at standard conditions @ +7°C)</i>	kW	YES - Optionnal	YES
<i>Peh (Electric Power Input at standard conditions @ +7°C)</i>	kW	YES - Optionnal	YES
<i>COP (Coefficient of Performance at standard conditions @ +7°C)</i>		YES - Optionnal	YES
<b>EN 14825:2022</b>			
<b>Seasonal Efficiency In Cooling</b>			
<i>Pdesignc (Design Load in cooling mode at Tdesign @ +35°C)</i>	kW	YES	YES
<i>SEER (Seasonal Energy Efficiency Ratio)</i>		YES	YES
<i>SEER Class (Seasonal Energy Efficiency Ratio Class)</i>		YES	YES
<i>Qce (Annual electricity consumption in cooling mode)</i>	kWh	YES	YES
<i>ηsc (Seasonal space efficiency in cooling mode)</i>	%	YES	YES
<b>Cooling PL Cond B</b>			
<i>Pc PL CondB (Total Cooling Capacity Part Load condition B @ 30°C)</i>	kW	YES	YES
<i>EER PL CondB (Energy Efficiency Ratio Part Load conditions B @ 30°C)</i>		YES	YES
<b>Cooling PL Cond C</b>			
<i>Pc PL CondC (Total Cooling Capacity Part Load condition C @ 25°C)</i>	kW	YES	YES
<i>EER PL CondC (Energy Efficiency Ratio Part Load conditions C @ 25°C)</i>		YES	YES
<b>Cooling PL Cond D</b>			
<i>Pc PL CondD (Total Cooling Capacity Part Load condition D @ 20°C)</i>	kW	YES	YES
<i>EER PL CondD (Energy Efficiency Ratio Part Load conditions D @ 20°C)</i>		YES	YES
<b>AVERAGE CLIMATE</b>			
<b>Seasonal Coefficient of Performance</b>			
<i>Pdesignh (Design Load in heating mode at Tdesign @ -10°C)</i>	kW	YES	YES
<i>SCOP (Seasonal Coefficient of Performance)</i>		YES	YES
<i>SCOP Class (Seasonal Coefficient of Performance Class)</i>		YES	YES
<i>Qhe (Annual electricity consumption in heating mode)</i>	kWh	YES	YES
<i>ηsh (Seasonal space efficiency in heating mode)</i>	%	YES	YES
<b>Heating PL CondA</b>			
<i>Ph PL CondA (Total heating capacity Part Load condition A @ -7°C)</i>	kW	YES	YES
<i>COP PL CondA (Coefficient of Performances Part Load condition A @ -7°C)</i>		YES	YES
<b>Heating PL CondB</b>			
<i>Ph PL CondB (Total heating capacity Part Load condition B @ +2°C)</i>	kW	YES	YES
<i>COP PL CondB (Coefficient of Performances Part Load condition B @ +2°C)</i>		YES	YES
<b>Heating PL CondC</b>			
<i>Ph PL CondC (Total heating capacity Part Load condition C @ +7°C)</i>	kW	YES	YES
<i>COP PL CondC (Coefficient of Performances Part Load condition C @ +7°C)</i>		YES	YES
<b>Heating PL Cond D</b>			
<i>Ph PL CondD (Total heating capacity Part Load condition D @ +12°C)</i>	kW	YES	YES
<i>COP PL CondD (Coefficient of Performances Part Load condition D @ +12°C)</i>		YES	YES

	Unit	VRF Programme	
		Cert. Perf	Web
<b>Heating PL Cond E - TOL</b>			
TOL (Operating LimitTemperature)	°C	YES	YES
Ph PL CondE (Total heating capacity Part Load condition E @ TOL -10°C or above)	kW	YES	YES
COP PL CondE (Coefficient of Performances Part Load condition E @ TOL -10°C or above )		YES	YES
<b>Heating PL Cond F - Bivalent Point</b>			
Tbiv (Bivalent Temperature)	°C	YES	YES
Ph PL CondF Tbiv (Total heating capacity Part Load condition F @ TBiv)	kW	YES	YES
COP PL CondF Tbiv (Coefficient of Performances Part Load condition F @ Tbiv)		YES	YES
<b>Auxiliaries in Cooling</b>			
Psbcc (Power consumption in standby mode in cooling mode)	W	YES	YES
Poffcc (Power consumption in off mode in cooling mode)	W	YES	YES
Ptoc (Power consumption in thermostat off mode in cooling mode)	W	YES	YES
Pckcc (Power consumption of the crankcase heater in cooling mode)	W	YES	YES
<b>Auxiliaries in Heating</b>			
Psbh (Power consumption in standby mode in heating mode)	W	YES	YES
Poffh (Power consumption in off mode in heating mode)	W	YES	YES
Ptohh (Power consumption in thermostat off mode in heating mode)	W	YES	YES
Pckhh (Power consumption of the crankcase heater in heating mode)	W	YES	YES
<b>COLDER CLIMATE</b>			
<b>Seasonal Coefficient of Performance Colder climate</b>			
Pdesignh_C (Design Load in heating mode at Tdesign @ -22°C )	kW	YES - Optionnal	YES
SCOP C (Seasonnal Coefficient of Performance Colder Climate)		YES - Optionnal	YES
SCOP Class C (Seasonal Coefficient Of Performance Class Colder Climate)		YES - Optionnal	YES
Qhe_C (Annual electricity consumption in heating mode)	kWh	YES - Optionnal	YES
ηsh_C (Seasonnal space efficiency (ηs) in heating mode)	%	N/A	N/A
<b>Heating PL CondG Colder</b>			
Ph PL CondG_C (Total heating capacity Part Load condition A @ -15°C )	kW	YES - Optionnal	YES
COP PL CondG_C (Coefficient of Performances Part Load condition A @ -15°C)		YES - Optionnal	YES
<b>Heating PL CondA Colder</b>			
Ph PL CondA_C (Total heating capacity Part Load condition A @ -7°C )	kW	YES - Optionnal	YES
COP PL CondA_C (Coefficient of Performances Part Load condition A @ -7°C)		YES - Optionnal	YES
<b>Heating PL CondB Colder</b>			
Ph PL CondB_C (Total heating capacity Part Load condition B @ +2°C)	kW	YES - Optionnal	YES
COP PL CondB_C (Coefficient of Performances Part Load condition B @ +2°C)		YES - Optionnal	YES
<b>Heating PL CondC Colder</b>			
Ph PL CondC_C (Total heating capacity Part Load condition C @ +7°C )	kW	YES - Optionnal	YES
COP PL CondC_C (Coefficient of Performances Part Load condition C @ +7°C)		YES - Optionnal	YES
<b>Heating PL Cond D Colder</b>			
Ph PL CondD_C (Total heating capacity Part Load condition D @ +12°C)	kW	YES - Optionnal	YES
COP PL CondD_C (Coefficient of Performances Part Load condition D @ +12°C )		YES - Optionnal	YES
<b>Heating PL Cond E - TOL Colder</b>			
TOL (Operating LimitTemperature)	°C	YES	YES
Ph PL CondE_C (Total heating capacity Part Load condition E @ TOL -22°C or above )	kW	YES - Optionnal	YES
COP PL CondE_C (Coefficient of Performances Part Load condition E @ TOL -22°C or above )		YES - Optionnal	YES
<b>Heating PL Cond F - Bivalent Point Colder</b>			
Tbiv_C (Bivalent Temperature Colder Cimate)	°C	YES - Optionnal	YES
Ph PL CondF Tbiv_C (Total heating capacity Part Load condition F @ TBiv)	kW	YES - Optionnal	YES
COP PL CondF Tbiv_C (Coefficient of Performances Part Load condition F @ Tbiv)		YES - Optionnal	YES
<b>WARMER CLIMATE</b>			
<b>Seasonal Coefficient of Performance Warmer climate</b>			
Pdesignh_W (Design Load in heating mode at Tdesign @ +2°C )	kW	YES - Optionnal	YES
SCOP W (Seasonnal Coefficient of Performance Warmer Climate)		YES - Optionnal	YES
SCOP Class W (Seasonal Coefficient Of Performance Class Warmer Climate)		YES - Optionnal	YES
Qhe_W (Annual electricity consumption in heating mode)	kWh	YES - Optionnal	YES
ηsh_W (Seasonnal space efficiency (ηs) in heating mode)	%	YES - Optionnal	YES
<b>Heating PL CondB Warmer</b>			
Ph PL CondB_W (Total heating capacity Part Load condition B @ +2°C)	kW	YES - Optionnal	YES
COP PL CondB_W (Coefficient of Performances Part Load condition B @ +2°C)		YES - Optionnal	YES
<b>Heating PL CondC Warmer</b>			
Ph PL CondC_W (Total heating capacity Part Load condition C @ +7°C )	kW	YES - Optionnal	YES
COP PL CondC_W (Coefficient of Performances Part Load condition C @ +7°C)		YES - Optionnal	YES



	Unit	VRF Programme	
		Cert. Perf	Web
<b>Heating PL Cond D Warmer</b>			
Ph PL CondD_W (Total heating capacity Part Load condition D @ +12°C)	kW	YES - Optionnal	YES
COP PL CondD_W (Coefficient of Performances Part Load condition D @ +12°C)		YES - Optionnal	YES
<b>Heating PL Cond E - TOL Warmer</b>			
TOL (Operating LimitTemperature)	°C	YES	YES
Ph PL CondE_W (Total heating capacity Part Load condition E @ TOL +2°C or above)	kW	YES - Optionnal	YES
COP PL CondE_W (Coefficient of Performances Part Load condition E @ TOL +2°C or above)		YES - Optionnal	YES
<b>Heating PL Cond F - Bivalent Point Warmer</b>			
Tbiv_W (Bivalent Temperature)	°C	YES - Optionnal	YES
Ph PL CondF Tbiv_W (Total heating capacity Part Load condition F @ Tbiv)	kW	YES - Optionnal	YES
COP PL CondF Tbiv_W (Coefficient of Performances Part Load condition F @ Tbiv)		YES - Optionnal	YES
<b>Cd</b>			
Cd (Cyclic degradation coefficient)		YES	YES
<b>EN 12102-1:2022</b>			
<b>Acoustic in cooling</b>			
LwO env (A-weighted sound power level outdoor unit non-ducted)	dB(A)	YES	YES
LwO duct (A-weighted sound power level outdoor unit ducted)	dB(A)	YES	YES
Lwl env (A-weighted sound power level indoor unit non-ducted)	dB(A)	YES	YES
Lwl duct (A-weighted sound power level indoor unit ducted)	dB(A)	YES	YES
<b>Acoustic in heating</b>			
LwO env_h (A-weighted sound power level outdoor unit non-ducted)	dB(A)	YES	YES
LwO duct_h (A-weighted sound power level outdoor unit ducted)	dB(A)	YES	YES
Lwl env_h (A-weighted sound power level indoor unit non-ducted)	dB(A)	YES	YES
Lwl duct_h (A-weighted sound power level indoor unit ducted)	dB(A)	YES	YES
<b>ISO 15042:2017, SASO 2874:2016, GSO 03 Draft - DESERT CERTIFICATION</b>			
<b>T1</b>			
PcT1 (Total Cooling Capacity at @ 35°C)	kW	YES	YES
PecT1 (Electric Power Input at @ 35°C)	kW	YES	YES
EERT1 (Combination (outdoor and indoor) Energy Efficiency Ratio at @ 35°C)		YES	YES
<b>T3</b>			
PhT3 (Total heating capacity at @ 46°C)	kW	YES	YES
PehT3 (Electric Power Input at @ 46°C)	kW	YES	YES
EERT3 (Combination (outdoor and indoor) Energy Efficiency Ratio at @ 46°C)		YES	YES
<b>T4</b>			
PhT4 (Total heating capacity at standard conditions @ 48°C)	kW	YES - Optionnal Kuwait only	YES
PehT4 (Electric Power Input at standard conditions @ 48°C)	kW	YES - Optionnal Kuwait only	YES
EERT4 (Combination (outdoor and indoor) Energy Efficiency Ratio at @ 48°C)		YES - Optionnal Kuwait only	YES
<b>Operability at 52°C</b>			
Operability_test (Operability at 52 °C for 2 hours)		YES	YES
<b>OTHER</b>			
<b>LRCONTMIN in Cooling</b>			
LRcontminc (Minimum continuous operation load ratio in cooling mode)		YES - Optionnal	YES
CcpLRcontminc		YES - Optionnal	YES
<b>LRCONTMIN in Heating</b>			
LRcontminh (Minimum continuous operation load ratio in heating mode)		YES - Optionnal	YES
CcpLRcontminh		YES - Optionnal	YES
<b>Caracteristiques</b>			
IU name		YES	YES
Mounting (Mounting Type)		YES	YES
Refrigerant		YES	YES
Main Power Supply(Voltage (V) - Phase - Frequency (Hz))		YES	YES
<b>Eligible CEE</b>			
Eligible CEE		YES - Optionnal	YES

### I.3. Definitions

In addition to the definitions specified in the Certification Manual and the definitions given in EN14511:2022 and EN14825:2022, EN 14511-3:2022, Commission Regulation (EU) 2016/2281 and 206/2012 and standard ISO 15042:2017, SASO 2874:2016 and GSO 03 Draft, the following definitions apply:



### I.3.1. Basic Model Group (BMG)

Each Participant/applicant declaration list will be grouped in Basic Model Groups (BMG). A basic model shall be defined by single module outdoor units which are essentially the same in terms of :

- Product type (ex: VRF/A/R)
- Refrigerant
- Compressor Model
- Outdoor Fan Model
- Outdoor unit dimensions : Height , Width Length

In the case of split packaged units, the unit containing the compressor shall be the reference unit.

If there are more than one model for a components, for example if there are two possibilities of compressor models for a unit, the participant shall declared all the model names in the single cell in the declaration file, adding a “/” symbol between each model name.

Single-Phase and three-Phase models can belong to the same BMG but are different models

### I.3.2. LRcontmin

LRcontmin is defined as the load rate under which a unit with a variable speed compressor behaves as an ON/OFF. Ratio of the capacity in heating (or cooling) divided by the heating (or cooling) capacity measured in the standard rating test conditions.

CcpLRcontmin is defined as the Ratio of the COP in heating (or EER in cooling) divided by the COP in heating (or EER in cooling) measured in the standard rating test conditions.

### I.3.3. AC versus VRF

The differences between AC units and VRF units are described below:

AC	VRF
Not individual operation control with a single refrigerant line	Individual operation control (whatever the mode) of indoor units with a single refrigerant line without additional control boxes
Individual operation control on the same mode with multiple refrigerant lines	Expansion valve close or inside indoor units

## I.4. Contributors

The lists of contributors are given for information and may be modified by ECC whenever necessary.

### I.4.1. Audit body

The audit functions are performed by the following body(ies), called audit body:

EUROVENT CERTITA CERTIFICATION SAS	Morning, Laffitte 34 rue Laffitte 75009 Paris, France www.eurovent-certification.com	+ 33 1 75 44 71 71
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### I.4.2. Independant laboratory / test body

The tests are performed at the request of ECC by the following independent laboratory:

CEIS - Centro de Ensayos Innovación y Servicios	Cr. de Villaviciosa de Odón Km. 1,5, 28935 Móstoles, Madrid, Spain www.ceis.es	+ 34 916 169 710
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## II. REQUIREMENTS OF THE REFERENCE DOCUMENT

### II.1. Reference documents

#### II.1.1. Product and test standards

The test procedure is detailed in the Appendix A and in the product and test standards. The applicable standards are as follow (non-exhaustive list):

##### II.1.1.1. Tests method standard

- Performance testing using the calorimeter room EN14511-3:2022 “Air conditioners, liquid chilling packages and heat pumps with electrically driven compressors for space heating and cooling”.
- Performance testing using the air enthalpy method: EN 14511-3:2022 “Air conditioners, liquid chilling packages and heat pumps with electrically driven compressors for space heating and cooling”.

##### II.1.1.2. Tests conditions standard

- EN 14825:2022 “Air conditioners, liquid chilling packages and heat pumps, with electrically driven compressors, for space heating and cooling. Testing and rating at part load conditions and calculation of seasonal performance”.
- SASO 2874:2016 “Air conditioners – Minimum energy performance requirements and testing requirements”
- GSO 03 Draft “Air conditioners – Minimum energy performance requirements and testing requirements”
- ISO 15042:2017 “Multiple split-system air-conditioners and air-to-air heat pumps - Testing and rating for performance”
- Acoustical testing: EN 12102-1:2022 “Air conditioners, liquid chilling packages, heat pumps and dehumidifiers with electrically driven compressors for space heating and cooling - Measurement of airborne noise - Determination of the sound power level”
- ISO 9614-1:1993 “Acoustics — Determination of sound power levels of noise sources using sound intensity”- Measurement at discrete points
- ISO 9614-2:1996 “Acoustics — Determination of sound power levels of noise sources using sound intensity”- Measurement by scanning
- ISO 9614-3:2009 “Acoustics — Determination of sound power levels of noise sources using sound intensity”

### II.2. Marking

It is highly recommended that the participating company indicates participation in the EUROVENT CERTIFIED PERFORMANCE (ECP) programme for air conditioners. The provisions of the Certification Manual apply.

## III. CERTIFICATION PROCESS

### III.1. Admission procedure

For the admission procedure, the campaign schedule on the appendix F is not applicable. In addition to the provisions laid down in the Certification Manual, the following requirements apply:

### III.1.1. Declaration of data

The applicant, after signing the Certification Agreement, shall send to ECC all the information required for the qualification: the Declaration files and relevant literature.

The forms shall be sent by e-mail to ECC within the time limits specified in Certification manual (see Certification Manual Art. 126). Copies of the forms are part of this Technical Certification Rules

The participant shall use suitable means to identify the products by a unique identification code (the minimum traceable information: production plant, N° of lot, components), and the retention of documented information (records) necessary to enable traceability.

#### III.1.1.1. Declaration of factories file VRF

The form *Declaration factories VRF* will be used for manufacturing companies (Original Equipment Manufacturer – OEM) to declare the list of manufacturing plants to ECC, and in which plant(s) its ranges are produced. The city and the country of the manufacturing plants will be visible on their certificate.

For units concerned by several plants, ECC may also select the manufacturing plant in the selection of unit. The manufacturing sites shall be identifiable on the product nameplate: A code / a city / ... etc. which will be checked by the laboratory on the unit before testing

#### III.1.1.2. Declaration file VRF

The form *Declaration file VRF* will be used for manufacturing companies (Original Equipment Manufacturer – OEM) to declare models. It must be completed for each different declared performance of each models that the manufacturer specify. The *Declaration file VRF* is send to Brand Name (BN) companies to identify the corresponding model's number of the original equipment manufacturer

#### Product types

The product type is defined by the following letters:

A: Air cooled , W : Water-cooled

H: Heating only, C: Colling only, R: Reversible

For Example: **VRF/A/R**

The desert certification products are define as : VRF/A/SYSTEM. A combination declared as an air-cooled VRF (VRF/A/C or VRF/A/R) can be declared as a VRF/A/SYSTEM as well.

The desert certification products can be declared at 60Hz or 50Hz

#### Capacity ratio in combinations

The capacity ratio at standard rating conditions shall be 100% + / - 5 % between the outdoor unit and the summation of all the indoor unit. The capacity ratio is calculated as per the following formulas:

For units in cooling only or reversible:

$$\text{Capacity ratio cooling} = \frac{\sum \text{Total capacity (Pc) of the all the indoor units in standard cooling conditions}}{\text{Total capacity (Pc) of the outdoor units in standard cooling conditions}}$$

For units in heating only:

$$\text{Capacity ratio heating} = \frac{\sum \text{Total capacity (Pc) of the all the indoor units in standard heating conditions}}{\text{Total capacity (Pc) of the outdoor units in standard heating conditions}}$$

If a system capacity ratio of 100 + / - 5 % can be reached with the same range of indoor unit than the tests shall be done using this combination

If a system capacity ratio of 100 + / - 5 % cannot be reached with the same range of indoor unit : sizes as similar as possible with the quantity of indoor units as close as possible but not more than the prescribed quantity in Table 1 shall be used to meet the system capacity ratio within 100 + / - 5%

## Mounting types

Each combination will be declared using the following mountings:

- Ducted
- Wall mounted
- Ceiling suspended
- Cassette, moreover, the type of cassette shall be declared:
  - 1-way
  - 2-way
  - 3-way
  - 4-way
  - circular flow

Other mountings or old codifications are not allowed.

For each outdoor unit, the declaration of one range of cassette indoor units and one range of ducted indoor units is mandatory. Declaration of additional ranges of cassette or ducted indoor units is voluntary. The indoor units shall all be of the same mounting type. If not possible, the combination can be of a maximum of two different types combined, for example cassettes and wall mounted. The maximum number of same model of indoor units for each type is 4. For instance, 3 cassettes of the same model can be mixed with 3 wall mounted of the same model.

ECC will check that the indoor and outdoor unit combinations defined by the manufacturer in *Declaration file VRF* are the possible ones from the strict application of the combination rules above

Duct horizontal with  $ESP_{nom} \geq 25$  Pa

## Airflow limit

For each indoor unit, the airflow limit of the indoor unit will be calculated using the cooling/heating capacity of the indoor unit at standard rating conditions (full load). The airflow at standard air condition defined in the standard EN 14511-3:2022 shall not exceed:

- 275 m<sup>3</sup>/h/kW for cassette units and ducted units

The limit shall apply at full load and part load in:

- Cooling mode
- Heating mode

The limit shall not apply for combinations with outdoor unit cooling capacity below 12 kW.

The participant shall ensure that the unit does not exceed the defined airflow and send the necessary equipment/instructions to limit the airflow during the test together with the method to be followed by the testing laboratory if the maximum airflow is exceeded.

If anyway the airflow of the unit exceeds the 275 m<sup>3</sup>/h/kW during the test, the following steps shall be applied:

- The laboratory shall contact immediately the Applicant/Participant to acquire the information to limit the airflow
- The manufacturer must provide the information within 3 hours. Afterwards, if the manufacturer fails to provide the information, the unit will be considered as initial test failure. This will only be done once.

Note: The declared performances of the unit must be related to the defined airflow limit. The participants can publish higher airflow rate in their catalogues to represent the maximum possible airflow of the unit.

The IU airflow rate test is a pre-test where each IU is installed individually and tested with no refrigerant connection

### **III.1.2. Admissibility of the application**

ECC proceeds to the selection of units to be tested based on the declaration file. The independent laboratory staff can then proceed to the products performances testing according to the procedure described in the sections below

In the meantime, an auditor appointed by ECC shall audit the manufacturing site chosen by ECC

### **III.1.3. Initial admission audit**

In addition to the provisions laid down in the Certification Manual, the following requirements apply:

#### **a. Purpose**

The purpose of the audit is to verify that the outdoor and indoor units produced by the manufacturer match the units supplied by the participants to the independent test lab for testing and to check if the declared values match the data published by the manufacturer.

For applicants, the audit shall be carried out during the qualifying procedure after all the elements for the tests have been provided to ECC.

#### **b. General**

Manufacturer will declare to ECC which factory (ies) are involved in the production of VRF systems in the same time as manufacturer provide the updated declaration list. In the *declaration of factories VRF* file. Based on that, ECC will determine the site for audit and advise the audit agency.

Note: for the auditor's safety prior to factory audit, the participant must provide in advance safety provisions to the auditor i.e. Safety Risk Assessment, Safety Needs including Equipment, etc. If these are not provided or confirmed, then the audit will not take place until they have been provided.

An observer, bounded to the respect of confidentiality (this observer is chosen by ECC by standards and agreements which he has signed), can take part to the audit. The holder is systematically informed by ECC of the presence of this observer prior to the audit.

The audits shall be ordered by ECC. The audit costs shall be paid by the manufacturer to ECC.

One factory will be verified per year per manufacturer.

Even if a factory produces just a part of declared units, a global checking of data can be done, when technically possible (example: link between manufacturer catalogue and Eurovent declaration).

The factory must have resources required to conduct the audit in English.

The duration of the site audit is one day (including audit preparation, the audit itself, the report writing and the management of the corrective actions, if relevant). This duration can be adjusted in the case of carrying out a joint audit with other certifications.

If audits are not conducted within the time limitations specified in the notification received from ECC, it is considered as non-application of procedures.

The auditor will check the complaint registers concerning the certified products.

#### **c. Verification of physical data (same as unit check)**

The physical verifications made are the same ones as the Unit check test as described above

#### **d. Audit Report and Audit Conclusions**

Based on the findings the agency will report compliance or non-compliance and any evidence that may affect conclusions of the manufacturer's level of responsibility. The independent agency shall send an Audit Report to ECC. After checking the audit report, ECC shall communicate audit conclusions and report to the participant.

In case of non-conformity, the manufacturer shall send within 1 month after the transmission of the Audit Report any mitigating circumstances to ECC. Then, the manufacturer shall receive the Audit Conclusions including whether or not the non-conformity is the manufacturer's responsibility.

### **Definitions:**

**C = Critical non-conformity:** That significantly affects the participation to the Certification Programme within ECC. Or that, while not jeopardizing a substantial participation in the Certification Programme, gives evidence of non-conformity that must be solved to ensure that the products comply with the stated requirements

**NC= Non critical non-conformity :** Situation of a formal misalignment with little or no impact on Certification Programme.

### **Example of critical non-conformities**

- Unrealistic declaration: The Manufacturer has no evidence of invoices (or other formal documents) from the previous year for the checked listed model. This non-conformity is not relevant for new products declared during the year of the audit.
- Discrepancies in BOM: One or more component(s) described in the production BOM don't match with declared Data of Record for a specific listed model checked.

### **Example of Non critical non-conformities:**

- Lack of documents: The Auditor requires clarification about one component described in the production BOM that the manufacturer doesn't have available to compare with declared Data of Record for a specific listed model checked.
- Lack of ECC evidence: The label used in Technical or Commercial documentation is not according to Certification Manual.
- If not solved from previous audit, a noncritical non-conformity becomes a critical non-conformity.

### **e. Failure treatment**

In case of non-conformity, ECC shall initiate the appropriate failure treatment procedures. The outcome of the failure treatment procedures may be that the participant/applicant is suspended temporarily from certification

The Audit failure treatment consists of the following:

- In case of non-critical non-conformity or critical non-conformity, the manufacturer shall send ECC the corrected documentation or figures within 1 month.
- Moreover, the participant/applicant is notified by ECC about its loss of points according to the dedicated chapter of Certification Manual.
- In case of violation of rules, the participant/applicant is suspended temporarily

#### **III.1.4. Implementation of checking operations**

ECC shall select units to be tested based on its evaluation of the *Declaration file VRF* communicated by the applicant. At least one (1) unit shall be selected to be tested per campaign.

The samples necessary for carrying out the tests may be taken:

- either from the Participant/applicant production line
- or a stocking point

##### **III.1.4.1. Number of units to be tested**

The number of units tested each year per participant/applicant shall be as follows:

- 15% (rounded up, at least 1) of the number of the listed BMG for air-sourced units
- 15% (rounded up, at least 1) of the number of the listed BMG for Water-sourced units
- 15% (rounded up, at least 1) of the number of the listed BMG for desert certification units

**Table 3: Number of required tests**

Number of Basic Model Groups	Number of tests
1 to 6	1
7 to 13	2
14 to 20	3
21 to 26	4
N	15%*N

ECC may ask The participant/applicant to provide several serial numbers by unit to guarantee that the unit is not specially designed for the test. ECC may choose a specific serial number to be tested

### III.1.4.2. Selection performances to be tested

#### a. Thermal measurements for VRF air-cooled and water-cooled units

For each outdoor unit with a rated capacity  $\leq 100$  kW selected by ECC for test, the following measurements and conditions shall be tested.

- Capacity (Pc) and efficiency (EER) at standard rating conditions / Part Load condition in cooling mode at +35°C)
- Capacity (Pc) and efficiency (EER) at Part Load in cooling to be chosen by ECC between Part Load condition B @ 30°C, C @ 25°C, D @ 20°C
- Capacity (Ph) and coefficient of performance (COP) at standard rating condition in heating mode at +7°C (Optional – tested if declared)
- Capacity (Ph) and coefficient of performance (COP) at PL condition F (Tbivalent) for the average climate
- Capacity (Ph) and coefficient of performance (COP) at PL condition F (Tbivalent) for each additional optional declared climate
- One capacity (Ph) and coefficient of performance (COP) at Part Load in heating in average climate to be chosen by ECC between Part Load condition A @ -7°C, B @ +2°C, C @ +7°C, D @ +12°C  
\*If PL conditions temperature = Tbiv, it cannot be chosen
- One capacity (Ph) and coefficient of performance (COP) at Part Load in heating for each additional climate to be chosen by ECC between Part Load condition A @ -7°C, B @ +2°C, C @ +7°C, D @ +12°C, G @ -15°C  
\*If PL conditions temperature = Tbiv, it cannot be chosen
- LRcontmin & CCPLRcontmin in cooling or heating. If both modes are declared, ECC will test one of them. The mode chosen for LRcontmin and CCPLRcontmin will be the same (Optional – tested if declared)
- One test among Psb, Pto, Poff and Pck in cooling mode
- One test among Psb, Pto, Poff and Pck in heating mode
- Test of Cd if declared at a different value than the default value (0.25).
- Airflow of the indoor units

#### b. Acoustic measurements for VRF

For VRF units  $\leq 12$  kW, A-weighted sound power level test for indoor(s) and outdoor shall be carried out for all units selected:

- In cooling mode for the cooling only and reversible units
- In heating mode for heating only units

For VRF units  $> 12$  kW, A-weighted sound power level test for outdoor units shall be carried out for all units selected:

- in cooling mode for cooling only units
- in heating mode for heating only units



- in cooling mode or in heating mode for reversible units (Randomly chosen by ECC)

### c. Unit check measurements

Unit check measurements are verifications done on one unit per campaign per participant/appliquant:

- Weight
- Dimensions of the casing (L x L x h). Only the enclosure of the unit is measured. The measurements don't include electrical boxes, condensate drain, pipes, valves, fan grids, duct frames, etc...
- Airflow (could be checked before in the regular tests)
- Number of rows and lines of the indoor heat exchanger
- Refrigerant type and charge

### d. Desert certification

The products in the desert certification are in cooling only or reversible. If the Participant/Apliquants declares the product VRF/A/SYSTEM, the following points shall all be declared and will be tested:

- Capacity and EER at T1 (35°C)
- Capacity and EER at T3 (46°C)
- Capacity and EER at T4 (48°C) – Optional, only for Kuwait
- Operability at 52°C for 2h

The EER for desert certification is defined as follow::

$$EER(T1 \text{ or } T3 \text{ or } T4) = \frac{P_{C_{out}}}{P_{C_{out}} + P_{C_{indoors}}}$$

If the combination tested is already certified as VRF/A/R or VRF/A/C at 50 Hz, the capacity at T1 will be the same as the cooling at standard rating condition. Therefore the EER at T1 can be calculated as per the formula above. The manufacturer can choose which unit(s) are selected [Outdoor unit/Indoor units] and at what frequency, in order to test the most representative samples, relative to their needs. The tested combination(s) shall be with ducted indoor units.

### e. Summarize table for VRF

**Table 4 : Measurements of VRF tests**

Conditions		Heating Only	Cooling Only	Reversible
Cooling	A (standard +35°C full load)	N/A	X	X
	One point at PL condition between : B, C, D	N/A	X	X
Heating	Nominal (+7°C standard rating condition)	(X)	N/A	(X)
	One point at PL condition T <sub>biv</sub> for the average climate	X	N/A	X
	One point at PL condition T <sub>biv</sub> for each additional climate	(X)	N/A	(X)
	One point at PL condition between : A (if ≠F), B (if ≠F), C, D or E (if ≠F) for the average climate	X	N/A	X
Auxiliaries	One point at PL condition between : A (if ≠F), B (if ≠F), C, D, G or E (if ≠F) for each additional climate	(X)	N/A	(X)
	One point between Poff, P <sub>sb</sub> , P <sub>to</sub> , P <sub>ck</sub> in heating	X	N/A	X
Auxiliaries	One point between Poff, P <sub>sb</sub> , P <sub>to</sub> , P <sub>ck</sub> in cooling	N/A	X	X
	Cd (if not 0.25 only)	X	X	X
Lrcontmin	In cooling or heating mode (must be the same mode as CCPLRcontmin)	(X)	(X)	(X)
CCPLRcontmin	In cooling or heating mode (must be the same mode as LRcontmin)	(X)	(X)	(X)
Unit check	One unit per campaign will have its physical characteristics measured by the laboratory	X	X	X
Acoustics	Indoor and outdoor units in cooling (for cooling only units and reversible) or heating (for heating only units for units ≤ 12kW)	X	X	X
	Outdoor units in cooling or heating (chosen randomly) for units ≥12kW	X	X	X
Desert Certification	Capacity and EER at T1 (35°C)	N/A	(X)	(X)
	Capacity and EER at T3 (46°C)	N/A	(X)	(X)
	Capacity and EER at T4 (48°C) – Optional, only for Kuwait	N/A	(X)	(X)
	Operability at 52°C for 2h	N/A	(X)	(X)

(X) To be tested if declared only

### III.1.4.3. Shipment to the laboratory

Once the samples are ready, they shall be delivered to the Laboratory by the participant/applicant. All transport fees shall be covered by the participant/applicant. The laboratory shall not engage any transport fees.

All units above 25 kg should be suitable to be lifted with proper tools.

The Laboratory shall have the responsibility of un-crating, handling and testing the units.

Deadline for delivery of units to the laboratory together with the technical forms duly completed, the starting procedure and the payment/order is given in the Certification Schedule (see Appendix F).

If units, technical forms, starting procedures and payment/orders are not delivered within the time limits specified in the notification received from ECC, it is considered as non-application of procedures (see Certification Manual). The unit is not considered as delivered when missing any documentation or software

### III.1.4.4. Tests at the independent laboratory

The specifications for the testing facility of the independent laboratory are given below:

**Table 5: Specifications for testing at the independent laboratory CEIS**

Water side	
Maximum water flow	45 m <sup>3</sup> /h
Temperatures	2 to 70°C
Air side	
Maximum air flow	17.900 m <sup>3</sup> /h (units < 30kW)
	36.000 m <sup>3</sup> /h (units from 30kW to 100 kW)
Outdoor Temperatures	from -22 to 54 °C
Relative humidity	up to 95%

#### a. Technical data sheet file and Starting Procedure

The *Technical data sheet* is a file sent by ECC and filled by the participant/applicant. It will be used to complete technical descriptions of all raw material of incoming goods for the units selected. *The Starting Procedure* explaining how to start the unit and to reach the proper frequency of the motor. They shall be completed and sent back to ECC including a contact person the laboratory can reach in case of problem with the test or the delivery and the instruction for the scrapping or returning of the units after the tests. (see Appendix B)

Before testing, the laboratory shall check the product against the information declared in the technical datasheet to ensure that the unit corresponds to the selection.

The laboratory shall not perform the test and contact ECC if:

- one of the information is not compliant with the technical datasheet
- one of the units appears damaged

ECC will contact the applicant regarding further actions.

#### b. Installation and preparation of the units to be tested

Units shall be installed in the test facility in accordance with the Participant/applicant published installation instructions. This information has to be readable in English.

It is not allowed to share accessories, pieces or devices between different selected models (example: Remote control...). Each unit must be sent to the lab with all needed accessories to be tested independently of any other, for example remote control, laptops (with instructions or screenshots), distribution kit, or any tool that can be used to set up the unit. Participant/applicant are not allowed to keep key tools from the laboratory until the last minute or based on attendance remote/on site.

The units needs to come with the latest version of the software uploaded. The laboratory will not update softwares on delivered units

The Participant/applicant will provide the laboratory with full information about the installation, including at least the following items:

- any adjustment of the fan speeds (change of connector, switches, etc.) and compressor frequency;
- any change of the settings for any part of the unit (for instance, switch for floor/ceiling mounting, switch for cooling only/heat pump unit, etc.);
- maximum external static pressure for ducted units;
- exact location of the refrigerant piping for multi-split systems

### **c. Participant/applicants personnel attendance**

Participant/applicant personnel can be allowed to attend the setting-up and the starting of the unit on request but not the test itself and are not permitted in the laboratory test room facility.

The attendance of the participant/applicant's personnel shall be indicated in the *Technical data sheet*

The laboratory shall inform the Participant at least:

- 3 weeks in advance about the test schedule.
- 2 Days in advance about the test starting hour.

Prior to the test, the Laboratory personnel are only allowed to:

- Repair leaks
- Repair or replace items damaged by shipping or handling
- Assure correct refrigerant charge
- Assure correct fan speed(s) where adjustable speed fans are used

If the unit is not repairable, ECC shall be contacted to provide further instructions.

A remote assistance to the test by the participant/applicant's personnel is possible.

### **d. Data shared before the test**

During the startup procedure, the following data can be shared:

- Compressor frequency\*
- Fan speed\*
- Power input
- Room temperatures inside tolerances

The data mentioned above are not always available and they are measured by indirect methods.

### **e. Startup allowed time and procedure to follow**

During the startup procedure, the participant/applicant is allowed to enter the laboratory facility, but the participant/applicant is forbidden to access the test control room at any time.

- *The startup procedure* has to be introduced by the lab personnel even if a laptop is required, that is why all of the instructions have to be provided in English.
- Once the startup procedure is introduced and the right setting conditions have been achieved the participant/applicant is no more allowed at the laboratory (example: if the units are on the right setting condition after 10 minutes, the participant/applicant is no more allowed to the lab).
- If the units fail to reach the right conditions, the manufacturer has 1 hour as maximum time to make some adjustments and after such period the lab has the right to invoice the additional time and to do not guarantee the test completion in the scheduled test day.

### **f. Order of the points to be tested**

For the testing in Heating mode, the laboratory shall perform the test in the following order if possible:

- Standard heating point
- Bivalent condition point
- Selected Part-load(s)

## **g. Data shared during or after the test**

The laboratory is not allowed to share any test result to Participant both during and/or after the test. ECC is responsible for providing all concerned test results to the participant.

### **III.1.4.5. Test conditions**

The tests shall be conducted at the conditions stated in Appendix A.

### **III.1.4.6. Reporting of test result file**

For models tested, the Reporting of test result file is sent by ECC, showing the deviations between claimed and measured data as well as the rerate propositions.

### **III.1.4.7. Failure treatment**

#### **a. Initial test failure**

If any functional component is inoperative, or the unit is damaged and cannot be repaired at the Laboratory, the unit is considered as an “initial test failure”. A new unit shall then be delivered within 8 weeks from the notification of the ITF to the participant by ECC.

It is also admitted that defrost during the thermal or acoustic test at +7°C is an “initial test failure” when:

- According to the standard:
  - Auto-defrost by reversal cycle within the stability or 70 min measurement period.
  - $\Delta T$  decreases by more than 2,5% during 70 min measurement period.
- According to the PA declaration this is an unusual/unexpected behaviour of the unit.

If two initial test failures happen successively, the following procedure is applied:

- The participant/applicant shall analyze and provide an explanation of the failures
- The product is removed from the declaration list and from manufacturer’s catalogue
- If the participant/applicant still wants to have the product certified, the product shall be tested again successfully
- A penalty test will be applied for the test campaign N+1

#### **b. Failure to meet the required capacity ratio for the capacity at Part load conditions**

The below procedure is not applicable for standard tested capacities.

As per the norm EN14825:2022 paragraph 5.7.3, the capacity ratio for part loads is defined as the measured capacity divided by the declared capacity:

$$\text{Capacity ratio for a Part Load (\%)} = \frac{\text{Capacity measured} - \text{Capacity declared by the participant at the Part load condition}}{\text{capacity declared by the participant at the Part load condition}} \times 100$$

If the capacity ratio measured is  $< \pm 10\%$  the measure is validated. If the capacity ratio measured is  $\geq \pm 10\%$  the following steps shall be applied:

- The laboratory should contact immediately the Applicant/Participant.
- The manufacturer has 2 working days to either provide new instructions or declare an error in the declaration list. If the manufacturer fails to provide new instructions on time the unit will be considered as initial test failure.
- The laboratory should proceed with the other required testing points while waiting for the new instructions. The 2 working days delay do not prevent a new installation
- For the test at bivalent condition, if the targeted capacity ratio is not  $< \pm 10\%$  in the second attempt, the test will be stopped and will be considered as an initial test failure. The manufacturer will have to review its data before further tests

### c. Failure to meet the power input or airflow for the indoor units

The indoor units shall be verified against the values claimed by the Participant, preferably prior to the installation:

$$\text{Power input ratio (\%)} = \frac{\text{Power input measured by the lab} - \text{Power input declared by the participant}}{\text{Power input declared by the participant}} \times 100$$

$$\text{Airflow (\%)} = \frac{\text{Airflow measured by the lab} - \text{Airflow declared by the participant}}{\text{Airflow declared by the participant}} \times 100$$

If the ratio measured is < 10% the measure is validated. If the capacity ratio measured is ≥ 10% the following steps shall be applied:

- The laboratory will immediately contact the manufacturer
- The manufacturer has 1 month to either provide new instructions, modify the unit on site, provide a new unit or declare an error in the declaration list.

### d. Failure of the unit check test

If one or several features of the unit check test are failed, the test results are rejected for the unit, and one compliant unit shall be delivered within 8 weeks. If it fails on the second unit, then another selected model of the campaign is verified.

If two have failed, all further models of the campaign are verified. Manufacturers will be charged for this additional task.

### e. Failure of general performances

For each test, a performance item fails when the difference between the declared value and the measurement differs by more than the acceptable acceptance criteria (see Appendix A). A test fails when one or more performance items fail. For each failed test, the Applicant/Participant/applicant has 4 weeks after notification of failure to choose between one of the following alternatives:

- Re-rate the products in accordance with the re-rating rules (see dedicated chapter below);
- Ask for a second test on the same unit;
- Ask for a second test on another unit of the same model selected by ECC.

### f. Second test

The article 117 of the Certification Manual is applicable in case of a second test.

Second test on the same unit: If the second test is performed on the same unit without any modification on the unit, and not leaving the laboratory :

- The second test can repeat just the failed points
- The participant/applicant has the right to choose a complete seasonal test (all points, including all auxiliaries).

Second test on a new unit : If the second test is performed on a repaired or a new unit, or if the participant/applicant has shipped back the unit, the points to be tested are the same as the first test. An additional unit (penalty test) will be selected for the next test campaign each time there is a second test on a new unit.

Re-rate : If the second test is unsuccessful, the Participant/applicant shall re-rate according to the results from the second test and the re-rating rules. The surveillance procedure does not allow for a third test.

#### III.1.4.8. Re-rating rules

For each failed test, the model shall be rerated according to the following rules. Different cases of rerates are proposed as example in the Annexe G:

### a. Proposal of rerate file

For models tested with failures, the *Proposal of rerate file* is sent by ECC, showing the list of products affected by the failed test and their proposal of rerate. (See annexe B)

### b. Rerating on Capacity at Tbivalent

The tested model shall be rerated to the measured value and all models with the same BMG shall be rerated according to the deviation measured:

- Tested model:  $\text{Perf}_{\text{rerated}} = \text{Perf}_{\text{measured}}$
- Models with same BMG:  $\text{Perf}_{\text{rerated}} = \text{Perf}_{\text{declared}} + \text{Deviation}$

### c. Rerating of auxiliary power consumption

The tested model shall be rerated to the measured value and all models with the same BMG shall be rerated according to the deviation measured:

- Tested model:  $\text{Perf}_{\text{rerated}} = \text{Perf}_{\text{measured}}$
- Models with same BMG:  $\text{Perf}_{\text{rerated}} = \text{Perf}_{\text{declared}} + \text{Deviation}$

### d. Rerating of capacity and/or efficiency at standard rating conditions

The tested model shall be rerated to the measured value and all models with the same BMG shall be rerated according to the deviation measured:

- Tested model:  $\text{Perf}_{\text{rerated}} = \text{Perf}_{\text{measured}}$
- Models with same BMG:  $\text{Perf}_{\text{rerated}} = \text{Perf}_{\text{declared}} + \text{Deviation}$
- Power input: recalculated with the rerated performances

### e. Rerating of EER and COP at Part load conditions

Whenever a measurement at a part-load condition selected by ECC shows a deviation on EER or COP larger than the allowed acceptance criteria, the deviation shall be applied to all the other part load EER (respectively COP) of the unit.

- Part Load tested:  $\text{Perf}_{\text{rerated}} = \text{Perf}_{\text{measured}}$
- Other Part loads of the same unit :  $\text{Perf}_{\text{rerated}} = \text{Perf}_{\text{declared}} + \text{Deviation of the COP or EER measured}$

In cooling, the concerned Part Loads are B, C and D

In heating, the concerned part Loads are A, B, C, D, G

**Special case:** If for the COP at T<sub>biv</sub>, the measurement of the COP shows a deviation larger than the allowed acceptance criteria **and** :

T<sub>biv</sub> = Temperature of the PLA in Average climate (-7°C)

T<sub>biv</sub> = Temperature of the PLB in Warmer climate (2°C)

T<sub>biv</sub> = Temperature of the PLG in Colder climate (-15°C)

The deviation shall be applied to the COP at Part load condition as well. Even if another Part Load is failed.

- Part Load A/G/B:  $\text{Perf}_{\text{rerated}} = \text{Perf}_{\text{declared}} + \text{Deviation of COP at Part Load T}_{\text{biv}}$

### f. Rerating of SEER and SCOP

When all points for SCOP/SEER are tested, ECC will recalculate the seasonal efficiency using:

- The declared value of part load, if the result is passed
- The measured value, if the result is failed (out of acceptance criteria)

Whenever a measurement at a part-load condition selected by ECC shows a deviation on EER or COP at part loads larger than the allowed acceptance criteria, the deviation shall be applied to all the other



part load EER (respectively COP) and then, SEER and SCOP will be recalculated by ECC, to be rerated.

Whenever the test on auxiliary power consumption or/and the test on capacity at extreme condition/bivalent condition shows a deviation larger than the allowed acceptance criteria the value of SCOP/SEER should be recalculated.

In case of recalculation of the SEER or SCOP the deviation on SEER or SCOP shall be applied to all models in the same basic model group (BMG). The annual energy consumption (Qce or Qhe) and seasonal space efficiency ( $\eta_{sc}$  or  $\eta_{sh}$ ) should be recalculated automatically for the tested unit and the deviation shall be applied to all models in the same basic model group (BMG):.

### SEER and COP recalculation

- Tested model:  $Perf_{rerated} = Perf_{recalculated}$
- Models with same BMG:  $Perf_{rerated} = Perf_{declared} + Deviation$

### Qce or Qhe

- Tested model:  $Perf_{rerated} = Perf_{recalculated}$
- Models with same BMG:  $Perf_{rerated} = Perf_{declared} + Deviation$

### Nsc and Nsh:

Tested model recalculation:

- $\eta_{sc} = \frac{100}{CC} \times SEER - 3\%$  where CC (conversion coefficient, equal to 2.5)
- $\eta_{sh} = \frac{100}{CC} \times SCOP - 3\%$  where CC (conversion coefficient, equal to 2.5)

Models with same BMG:  $Perf_{rerated} = Perf_{declared} + Deviation$

**Table 5: Synthesis of situation with SEER/SCOP recalculations**

FAILED ITEM	RECALCULATION	
	SEER	SCOP
<b>Cooling Part Loads</b>		
EER PL CondB ( <i>Energy Efficiency Ratio Part Load conditions B @ 30°C</i> )	X	
EER PL CondC ( <i>Energy Efficiency Ratio Part Load conditions C @ 25°C</i> )	X	
EER PL CondD ( <i>Energy Efficiency Ratio Part Load conditions D @ 20°C</i> )	X	
<b>Heating Part Loads - All Climates</b>		
COP PL ConDA ( <i>Coefficient of Performances Part Load condition A @ -7°C</i> )		X
COP PL CondB ( <i>Coefficient of Performances Part Load condition B @ +2°C</i> )		X
COP PL CondC ( <i>ECoefficient of Performances Part Load condition C @ +7°C</i> )		X
COP PL CondD ( <i>Coefficient of Performances Part Load condition D @ +12°C</i> )		X
COP PL CondG ( <i>Coefficient of Performances Part Load condition D @ -15°C</i> )		X
COP PL ConDE ( <i>Coefficient of Performances Part Load condition E @ TOL</i> )		X
Ph PL CondF Tbiv ( <i>Total heating capacity Part Load condition F @ TBiv</i> )		X
COP PL CondF Tbiv ( <i>Coefficient of Performances Part Load condition F @ Tbiv A</i> )		X
<b>Auxiliaries in Cooling</b>		
P <sub>sb</sub> c ( <i>Power consumption in standby mode in cooling mode</i> )	X	
P <sub>off</sub> c ( <i>Power consumption in off mode in cooling mode</i> )	X	
P <sub>to</sub> c ( <i>Power consumption in thermostat off mode in cooling mode</i> )	X	
P <sub>ck</sub> c ( <i>Power consumption of the crankcase heater in cooling mode</i> )	X	
<b>Auxiliaries in Heating</b>		
P <sub>sb</sub> h ( <i>Power consumption in standby mode in heating mode</i> )		X
P <sub>off</sub> h ( <i>Power consumption in off mode in heating mode</i> )		X
P <sub>to</sub> h ( <i>Power consumption in thermostat off mode in heating mode</i> )		X
P <sub>ck</sub> h ( <i>Power consumption of the crankcase heater in heating mode</i> )		X



### g. Rerating on acoustic performances

The tested model shall be rerated to the measured value and all the outdoor models only with the same BMG shall be rerated according to the deviation measured minus 1 dB(A):

- Tested model (outdoor or indoor):  $Perf_{rerated} = Perf_{measured}$
- Models with same BMG (Outdoor only) :  $Perf_{rerated} = Perf_{measured} + Deviation - 1 \text{ dB(A)}$ .

### h. Rerating on LRcontmin and CCPLRcontmin

#### LRcontmin

If the unit does not allow to keep stable conditions during the test as defined in EN 14511:2022 or if the deviation of LRcontmin exceed the acceptance criteria, then LRcontmin is failed. The tested model LRcontmin becomes 0.4 (default value). The deviation shall be applied to all models in the same basic model group (BMG):

- Tested model:  $Perf_{rerated} = 0.4$
- Models with same BMG:  $Perf_{rerated} = Perf_{declared} + Deviation$

If the LRcontmin  $Perf_{rerated} > 0.4$  for a unit of the same BMG, then the LRcontmin is rerated to 0.4 for that unit

#### CCPLRcontmin

If the unit does not allows to keep stable conditions during the test as defined in EN 14511:2022 or if the deviation of CCPLRcontmin exceed the acceptance criteria, then CCPLRcontmin is failed. CCPLRcontmin the tested model shall be rerated in accordance with the test result. The deviation shall be applied to all models in the same basic model group (BMG):

- Tested model:  $Perf_{rerated} = Perf_{measured}$
- Models with same BMG:  $Perf_{rerated} = Perf_{declared} + Deviation$

If the CCPLRcontmin  $Perf_{rerated} < 1$  for the tested unit or for a unit of the same BMG, then the CCPLRcontmin is rerated to 1.

### i. Rerating rules synthesis

**Table 6: Synthesis of rerated**

Failed point	Rerated values	
	Tested model	Models with the same BMG
<b>Pc or Ph</b>	$Pc_{rerated} = Pc_{measured}$	$Pc_{rerated} = Pc_{declared} + Deviation$
	$P_{E_{rerated}} = Pc_{rerated} / EER_{declared}$	$P_{E_{rerated}} = Pc_{rerated} / EER_{declared}$
<b>EER or COP</b>	$EER_{rerated} = EER_{measured}$	$EER_{rerated} = EER_{declared} + Deviation$
	$P_{E_{rerated}} = Pc_{declared} / EER_{rerated}$	$P_{E_{rerated}} = Pc_{declared} / EER_{rerated}$
<b>Pc + EER or Ph + COP</b>	$Pc_{rerated} = Pc_{measured}$	$Pc_{rerated} = Pc_{declared} + Deviation$
	$EER_{rerated} = EER_{measured}$	$EER_{rerated} = EER_{declared} + Deviation$
	$Pe(c)_{rerated} = Pc_{rerated} / EER_{rerated}$	$Pe(c)_{rerated} = Pc_{rerated} / EER_{rerated}$
<b>Acoustics</b>	$LwO \text{ or } LWI_{rerated} = LwO \text{ or } LWI_{measured}$	Only for the outdoor unit
		$LwO_{rerated} = LwO + Deviation - 1 \text{ dB(A)}$
<b>LRcontmin</b>	$LRcontmin_{rerated} = 0.4$	$LRcontmin_{rerated} = LRcontmin_{declared} + deviation$
		If the LRcontmin $Perf_{rerated} > 0.4$ , then $Perf_{rerated} = 0.4$
<b>CcpLRcontmin</b>	$CcpLRcontmin_{rerated} = CcpLRcontmin_{measured}$	$CcpLRcontmin_{rerated} = CcpLRcontmin_{declared} + deviation$
		If the LRcontmin $Perf_{rerated} < 1$ then $Perf_{rerated} = 1$
<b>Psb or Pto or Poff or Pck</b>	$Psb_{rerated} = Psb_{measured}$	$Psb_{rerated} = Psb_{declared} + deviation$
<b>SEER or SCOP</b>	Recalculated	$SEER_{rerated} = SEER_{declared} + Deviation$
<b>ηsc or ηsc</b>	Recalculated	$ηsc_{rerated} = ηsc_{declared} + Deviation$
<b>Qce or Qhe</b>	Recalculated	$Qce_{rerated} = Qce_{declared} + Deviation$
<b>Ph a Tbiv</b>	$Ph_{rerated} = Ph_{measured}$	$Ph_{rerated} = Ph_{declared} + deviation$

**Table 7: Synthesis for rerates of items within the same model tested**

Failed point	Rerated values		
	Tested Part-Load	Other Part-Loads of the test	SEER or SCOP
EER or COP	$EER_{rerated} = EER_{measured}$	$EER_{rerated} = EER_{declared} + (Dev_{of\ the\ tested\ PL})$	$EER_{rerated}$
EER or COP when all PL tested	$EER_{rerated} = EER_{measured}$	No re-rate. All PL are measured	$EER_{measured}$
COP at T <sub>biv</sub>	$COP_{rerated} = COP_{measured}$	In case T <sub>biv</sub> is the same Temperature as another PL	$COP\ PL\ A/B/G_{rerated} / COP\ T_{biv}_{rerated}$
		$COP\ PL\ A/B/G_{rerated} = COP\ PL\ A/B/G_{declared} + (Dev_{COP\ at\ T_{biv}})$	

### III.1.4.9. Possible Uprating

At the moment of the annual declaration, an uprating of performances from a same BMG is allowed:

- If the deviation of tested unit (in the BMG) is above inversed acceptance criteria
- Or if:
  - Units are not already tested and rerated and
  - Units of the BMG, if we received the proof (=report) that the tested unit was very underrated

### III.1.4.10. Time limitation for the recovery of units

The participant shall indicate in the TDS, in the appropriate section, if they want the unit returned after the testing is over or if they want to scrap it. It shall also include a contact person the laboratory can reach to coordinate. The following procedure will apply for all units:

- Within **8 weeks** after receiving the test report, ECC shall notify the laboratory whether a unit is intended to be used for a second test.
- The Unit remains at the independent laboratory, when:
  - 2<sup>nd</sup> test will be required on the same unit
  - The same unit declared as ITF will be used for the pending test.
- If no 2<sup>nd</sup> test is required on the same unit, or in case of a second ITF on the same unit, or without any notification from ECC to the Laboratory within **8 weeks** after receiving the test report, the option chosen into the TDS applies (scrapping/recovery).
- For the recovery option, the manufacturer has maximum of **4 weeks to recover** the unit since the official notification of the recovery allowance from the laboratory. In case he doesn't, the unit will be disposed and ECC will duly manage the scrapping invoice.

### III.1.5. Evaluation and decision

The certification is granted on condition that:

- The test campaign (N) has been successfully completed
- The audit scheduled during the campaign N has been performed by the auditor and is successful or the corrective actions plan is considered satisfactory;
- The product delivery together with the technical datasheet, the starting procedure have been completed
- The payments have been settled
- Penalty tests following an admission procedure need to be validated before the certification is granted.

## III.2. Surveillance procedure

### III.2.1. Implementation of surveillance operations

#### III.2.1.1. Surveillance Audit

For the surveillance procedure, the surveillance audit follows the same rules than the admission audit.

#### III.2.1.2. Update of the declaration list

ECC will requests an update of *the Declaration file VRF* every year, at the beginning of a new campaign (see annexe F). The Participant shall update their declaration list form following the same requirements as the admission campaign.

Beside current models, the Participants shall provide ECC with the list of obsolete and deleted models.

**Deleted Models** are listed on the website under the heading "Deleted" for one year. Production of Deleted Models has ceased but stock is still available for sale.

**Obsolete Models** are not listed on the Eurovent Certified Performance website. Production of Obsolete Models has ceased and there is no remaining stock for sale.

Models affected by failed tests in year n cannot be declared as Obsolete. They can only be listed as Deleted Models in year n+1 for one year.

### **III.2.1.3. Update of the factory declaration list**

ECC will requests an update of *the Declaration factories file VRF* every year, at the beginning of a new campaign (see annexe F) the Participant shall update their declaration list form following the same requirements as the admission campaign.

### **III.2.1.4. Selection of units to be tested**

For the surveillance procedure, the selection follows the same rules than the admission procedure.

### **III.2.1.5. Surveillance tests**

For the surveillance procedure, the surveillance tests follows the same rules than the admission tests.

### **III.2.1.6. Technical and commercial documentation check**

The provisions of the Certification Manual apply.

### **III.2.1.7. Penalty tests**

An additional unit will be selected for the next test campaign each time there is a deviation by more than the high acceptance criteria (see Appendix A) on:

- efficiency and/or capacity;
- sound power level.

An additional unit will be selected for the next test campaign each time there is a second test on a new unit.

## **III.2.2. Evaluation and decision**

Every year, ECC checks whether the performance of the products still meet the requirements. Surveillance tests in independent laboratory shall be conducted annually in compliance with the Certification Schedule (see Appendix F).

For the surveillance procedure the certification is renewed at the date specified in the Certification Schedules (see Appendix F) on condition that:

- The previous test campaign (N-1) has been successfully completed
- The audit scheduled during the campaign N has been performed by the auditor and is successful or the corrective actions plan is considered satisfactory;
- The product delivery together with the technical datasheet, the starting procedure have been completed
- The payments have been settled

The company receives a renewed certificate and the display of data is maintained on the Eurovent Certified Performance (ECP) website. If not, failure treatment shall be applied.

### **III.3. Declaration of modifications**

The provisions of the Certification Manual apply.

#### **III.3.1. Changes concerning the participant/applicant**

The provisions of the Certification Manual apply.

#### **III.3.2. Changes concerning production entities**

The provisions of the Certification Manual apply.

#### **III.3.3. Additional admission for a new model and/or new range**

The provisions of the Certification Manual apply.

#### **III.3.4. Changes concerning the certified product**

The applicant/participant shall inform ECC of any modification of the product portfolio by updating the declaration file VRF. Non-compliance of the applicant/participant/applicant is considered as non-application of procedures

ECC decides whether the modification is significant for the certified performance data or not. In the case of significant modifications ECC is entitled to request adequate tests to check the influence on performance data. This test shall not be considered as a repetition one.

#### **III.3.5. Temporary or permanent cessation of production of a certified product**

The provisions of the Certification Manual apply.

### **III.4. Suspension/cessation conditions**

The provisions of the Certification Manual apply.

# APPENDIX A. TECHNICAL APPENDIXES

## A.1. Purpose

The purpose of this document is to establish definitions and specifications for the testing and rating of (relevant products) for the Variable Refrigerant Flow Systems (VRF) Programme.

## A.2. Procedures for testing thermal points

For VRF units with a total cooling capacity  $\leq 12\text{kW}$ , power input to indoor units and linked corrections to both power input and capacity according to EN 14511-3:2022 apply. For VRF units above 12kW, the corrections of the total cooling capacity or heating capacity due to the power input of fans for indoor units with duct connection described in EN 14511-3:2022 clause 4.1 shall not be carried out.

The tests shall be carried out at 230 V for one phase units and 400 V for three phase units, with the rated frequency of 50 Hz. For one phase units: the MPS shall be declared as 230-1-50 and for three phase units: the MPS shall be declared as 400-3-50.

For high ambient units, it is possible to test the units with the rated frequency of 60 Hz., the MPS shall be declared as: 230-1-60 for one phased unit and 400-3-60 for three phase units.

The periodic refrigerant recovery function of the VRF system shall be disabled during the tests.

Due to testing facility constraints, the total piping length for VRF units is as below:

**Table 8: Piping length and correction factor**

Total cooling Capacity [kW]	Number of indoor units	Piping length [m]	Cooling correction factor	Heating correction factor
$0 < P \leq 12$	4 (ducted) 2 (cassette)	5 to 7,5 (Referred to paragraph 4.2.2.2 of EN14511-3)	NA	NA
$12 < P < 30$	4	11m $\pm$ 0,5 Min length IU-last distributor 5m	1,02	1,01
$30 \leq P < 50$	6	15m $\pm$ 0,5 Max. Length OU-1st distributor 2,5m Min length IU-last distributor 5m	1,03	1,02
$50 \leq P \leq 100$	8	15m $\pm$ 0,5 Max. Length OU-1st distributor 2,5m Min length IU-last distributor 5m	1,03	1,02

## Conditions for High Ambient

Tests according to ISO15042 standard shall be carried out at the following testing conditions:

**Table 9: Operating conditions for high ambient systems**

	INDOOR UNIT		OUTDOOR UNIT	
	Air entering °C		Air entering °C	
	Dry bulb	Wet bulb	Dry bulb	Wet bulb
T1 (1)	27	19	35	24
T3	29	19	46	24
T4	26.6	19.4	48	24
Operability test	26.7	19.4	52	31

## 1) LRcontmin test method

Two tests have to be performed:

- A heating (respectively cooling) capacity test at this load ratio to verify the continuous operation of the unit (no cycling) and record the heating capacity and the COP (respectively EER) at LRcontmin.
- A heating (respectively cooling) capacity test at the standard rating conditions and record the capacity and the COP (respectively EER) in these standard rating conditions.

LRcontmin is then calculated and validated, as follows:

In cooling:

$$LRcontminc = \frac{Pc \text{ at LRcontmin}}{Pc \text{ at standard rating conditions}}$$

In heating:

$$LRcontminh = \frac{Ph \text{ at LRcontmin}}{Ph \text{ at standard rating conditions}}$$

CcpLRcontmin is then calculated and validated, as follows:

In cooling:

$$CcpLRcontminc = \frac{EER \text{ at LRcontmin}}{EER \text{ at standard rating conditions}}$$

In heating:

$$CcpLRcontminh = \frac{COP \text{ at LRcontmin}}{COP \text{ at standard rating conditions}}$$

The default value for Lrcontmin is 0.4 and for CCPLRcontmin is 1

## 2) LRcontmin test method for heating mode only (Alternative method)

The only case in which “Part Load C” values (Ph and COP) could be used in the calculation of LRcontmin is when the 3 following requirements are met:

- Unit has to be declared with minimum compressor frequency for Part Load C.
- Capacity declared at such Part Load C (which corresponds to minimum compressor frequency) complies with standard acceptance criteria (10%).
- The declared LRcontmin is between 0.35 and 0.4

Otherwise, the test described at standard rating conditions is required.

The manufacturer shall inform ECC which method is used regarding this declaration once the unit is selected for testing.

### **A.3. Procedures for sound testing**

For VRF systems below 12 kW, at least two sound power levels have to be measured: one for indoor and one for outdoor side.

For systems with more than two indoor units, the acoustic tests (which means systems with 4 ducted indoor units, according to Table 1) have to be performed as follow:

- When testing the outdoor unit for sound, the system has to be installed completely (Outdoor unit + Indoor units) and the test is executed in heating or cooling mode
- When testing the indoor unit(s) for sound, the test is executed with one indoor unit only, running in fan mode if the indoor units are the same, or with two indoor units in case of different models.

When there is no ducting, the measurement is performed with the corresponding unit in the reverberation room. When there is ducting, the unit is installed outside of the reverberation room and a

duct is installed between its outlet and the reverberation room. A pressure difference corresponding to the claimed available pressure is adjusted with a tolerance of 10% or 5 Pa, whichever is higher.

Piping length shall be as close for the sound testing than for the cooling test. The VRF system shall be running in the same conditions of fan speed, water or air flow rates, compressor frequency, etc than during the measurement of the cooling capacity; this applies for the outdoor as well as for the indoor units.

Sound power tests shall be performed as per EN 12102-1:2022. When implementing the sound power measurements using the ISO 9614-1 method, "engineering grade" is not always achievable. "Surveillance grade" results are accepted as far as the overall measurement uncertainty is equivalent to "engineering grade" test results. Duct end correction of the noise figures described in section 6.2.2. are not applicable for the purpose of the certified values.



## A.4. Acceptance criteria

When the connection ratio is below 1: Deviation=  $\frac{\text{Measured capacity system} - \text{Declared capacity}}{\text{Declared capacity}}$

When declared and measured data shall not differ more than the acceptance criteria of table below:

**Table 10 : Acceptance criterias and high deviations**

Item Measured	Deviation calculation	Acceptance criteria	High deviation
Capacity in cooling (Pc) or heating (Ph) at standard rating conditions	(Measured - Declared)/Declared	< -8%	< -12%
Capacity at T1, T3, T4 for Desert Certification			
Capacity at T <sub>biv</sub>	(Measured - Declared)/Declared	< -11%	<-13%
EER or COP at standard rating conditions	(Measured - Declared)/Declared	< -10 %	<-12%
EER at T1, T3, T4 for Desert Certification			
SEER or SCOP if all points are tested	(Measured - Declared)/Declared	< -8%	< -12%
SEER or SCOP recalculated	(Measured - Declared)/Declared	< -0,5%	N/A
A-weighted sound power level	Measured - Declared	>+2 dB(A)	> +3 dB(A)
P <sub>off</sub> , P <sub>sb</sub> , P <sub>to</sub> , P <sub>ck</sub>	If the declared value is ≤ 10W Measured - Declared	1W	N/A
	If the declared value is > 10W (Measured - Declared)/Declared	> +10%	N/A
L <sub>rcontmin</sub>	(Measured - Declared)/Declared	> +5%	N/A
CCPL <sub>rcontmin</sub>	(Measured - Declared)/Declared	> -5%	N/A
<b>UNIT CHECK</b>			
Weight	(Measured - Declared)/Declared	> +/- 5%	N/A
Each (Lenght or Width or height)	(Measured - Declared)/Declared	> +/- 5%	N/A
Airflow	(Measured - Declared)/Declared	> +/-10%	N/A
Nb of rows in the IU heat exchanger	Measured - Declared	0	N/A
<b>AVERAGE CLIMATE</b>			
EER on part load point		< -(4+6/%Part Load)	< -(4+8/%Part Load)
Part Load B	(Measured - Declared)/Declared	<-12%	<-15%
Part Load C	(Measured - Declared)/Declared	<-17%	<-21%
Part Load D	(Measured - Declared)/Declared	<-33%	<-42%
COP on part load point		< -(4+6/%Part Load)	< -(4+8/%Part Load)
Part Load A	(Measured - Declared)/Declared	<-11%	<-13%
Part Load B	(Measured - Declared)/Declared	<-15%	<-19%
Part Load C	(Measured - Declared)/Declared	<-21%	<-27%
Part Load D	(Measured - Declared)/Declared	<-43%	<-56%
Part Load E	(Measured - Declared)/Declared	<-11%	<-13%
Part Load F	(Measured - Declared)/Declared	<-11%	<-13%
<b>COLDER CLIMATE</b>			
COP on part load point		< -(4+6/%Part Load)	< -(4+8/%Part Load)
Part Load G	(Measured - Declared)/Declared	<-11%	<-14%
Part Load A	(Measured - Declared)/Declared	<-14%	<-17%
Part Load B	(Measured - Declared)/Declared	<-20%	<-26%
Part Load C	(Measured - Declared)/Declared	<-29%	<-38%
Part Load D	(Measured - Declared)/Declared	<-61%	<-80%
Part Load E	(Measured - Declared)/Declared	<11%	<14%
Part Load F	(Measured - Declared)/Declared	<14%	<17%
<b>WARMER CLIMATE</b>			
COP on part load point		< -(4+6/%Part Load)	< -(4+8/%Part Load)
Part Load B	(Measured - Declared)/Declared	<-10%	<-12%
Part Load C	(Measured - Declared)/Declared	<-13%	<-16%
Part Load D	(Measured - Declared)/Declared	<-25%	<-32%
Part Load E	(Measured - Declared)/Declared	<-10%	<-12%
Part Load F	(Measured - Declared)/Declared	<-10%	<-12%

## APPENDIX B. FORMS

All characteristics and performances shall be expressed in SI units. Maximum of 3 significant digits shall be used for capacity, EER, COP, SEER, SCOP, power consumption and water pressure drop and 2 significant figures for sound power. Submittal of data shall be made by filling in the forms provided by ECC as .xls or .xlsx files

### B.1. Form : Declaration file VRF

The form Declaration file VRF to be filled in shall be sent by ECC to:

- Applicants who have signed the license agreement
- Participant/applicants, on an annual basis before the deadline specified in the Certification schedule

A template is available for information and upon request.

### B.2. Form : Declaration factories VRF

The form Declaration factories VRF to be filled in shall be sent by ECC to:

- Applicants who have signed the license agreement
- Participant/applicants, on an annual basis before the deadline specified in the Certification schedule

A template is available for information and upon request.

### B.3. Form : Technical Data Sheet (TDS)

The form Technical Data Sheet (TDS) to be filled in shall be sent by ECC to applicants/participant after the tests selections are completed

It is mandatory to provide the Technical Data Sheet form before the deadline in the calendar (see Appendix G)

A template is available for information and upon request.

### B.4. Form : Starting Procedure (SP)

The form Starting procedure is sent directly by the participant/applicant to ECC before the laboratory can test the unit.

It is mandatory to provide the starting procedure form before the deadline in the calendar (see Appendix G)

### B.5. Form : Reporting of test results file

REPORTING OF TEST RESULT											
GENERIC		Test key: Created on: Last update on: Status:									
MANUFACTURER		Participant key: Participant name:									
MODEL		Model key: Model name: Product type: Serial number:									
TEST		Programme - Sub-programmes: Air Conditioners/Comfort Air Conditioners Date of reception of the unit: xxx/xx/xx Date of reception of test report: xxx/xx/xx Unit tested on:									
RESULT DETAILS											
APPLICATION		General			Measurement		MEV		High failure		
AC_ClassCOP	-	Measured	Declared	Deviation	Limit	Result	Limit	Result	Limit	Result	
AC_ClassEER	-										
APPLICATION		Thermal			Measurement		MEV		High failure		
PE	kW	Measured	Declared	Deviation	Limit	Result	Limit	Result	Limit	Result	
EER	-										
Ph	kW										
COP	-										
Pec	kW										
Pwh	kW										
APPLICATION		Acoustic			Measurement		MEV		High failure		
LwCenv	dB(A)	Measured	Declared	Deviation	Limit	Result	Limit	Result	Limit	Result	
Lw1 env	dB(A)										
Lw2 env	dB(A)										
TEST CONCLUSION											
							Test	MEV x/x	High failure x penalty test(s)		

### B.6. Form: Proposal of rerate file

PROPOSAL OF RERATE											
GENERIC		Rerate key: Created on: xxx/xx/xx Last update on: Status:									
MANUFACTURER		Participant key: Participant name: F									
TEST		Test key: Unit tested on: xxx/xx/xx									
APPLICATION Acoustic											
DECLARED											
Product key	Product name	Type of product	Range name	BMG	Perf 1.1						
RERATED											

## Appendix C. CALCULATION METHOD AND IMPLEMENTATION OF MVF

### C.1. General

Mean Value of Failure (MVF) is equal, for each manufacturer, to the ratio between the total number of measurements above the high deviation criteria and the total number of performed measurements in the considered years.

$$MVF_n = \frac{\sum_{\text{Considered years}} \text{Number of measurements failed}}{\sum_{\text{Considered years}} \text{Number of measurements performed}}$$

One global MVF is calculated for each participant. The following performances are considered for the calculation of the MVF:

- Cooling and heating capacity at standard rating conditions
- EER and COP at standard rating conditions and in Part Loads, for all the climates
- Sound power levels including outdoor and indoor measurements
- Capacity at Bivalent point

ECC takes into consideration data of the last three test campaigns of each participants.

When there is a second test, then the first test is not taken into account.

A manufacturer is suspended from the Certification Programme for one test campaign if the MVF is strictly higher than 15%.

### C.2. Implementation and newcomers

Data of new participant/applicants will be first taken into account after two test campaigns (including admission tests).

### C.3. Notification of being suspended

A participant/applicant who is going to be suspended will receive a notification from ECC, with a possible additional selected unit to be tested. The purpose of this additional test is to give the participant/applicant the opportunity to comply with the limits. The response to ECC with confirmation of request for additional testing has to be done within 30 days after this notification, and the unit has to be delivered within 45 days after this notification.

## Appendix D. ECO-DESIGN AND ENERGY LABELLING FOR VRF ≤ 12 kW

Commission Regulation (EU) No 206/2012 implementing Directive 2009/125/EC of the European Parliament and of the Council with regard to ecodesign requirements for air conditioners and comfort fans gives requirements for all air conditioners with the cooling capacity under 12 kW introduced on the European market after 1 January 2013. The Directive defines maximum sound power levels and energy efficiency as given in the following tables,

Table 5  
Requirements for maximum sound power level

Rated capacity ≤ 6 kW		6 < Rated capacity ≤ 12 kW	
Indoor sound power level in dB(A)	Outdoor sound power level in dB(A)	Indoor sound power level in dB(A)	Outdoor sound power level in dB(A)
60	65	65	70

Table 6  
Requirements for minimum energy efficiency

	Air conditioners, except double and single duct air conditioners		Double duct air conditioners		Single duct air conditioners	
	SEER	SCOP (heating season: Average)	EER <sub>rated</sub>	COP <sub>rated</sub>	EER <sub>rated</sub>	COP <sub>rated</sub>
If GWP of refrigerant > 150 for < 6 kW	4,60	3,80	2,60	2,60	2,60	2,04
If GWP of refrigerant ≤ 150 for < 6 kW	4,14	3,42	2,34	2,34	2,34	1,84
If GWP of refrigerant > 150 for 6-12 kW	4,30	3,80	2,60	2,60	2,60	2,04
If GWP of refrigerant ≤ 150 for 6-12 kW	3,87	3,42	2,34	2,34	2,34	1,84

Commission Regulation (EU) No 626/2011 supplementing Directive 2010/30/EU of the European Parliament and of the Council with regard to energy labelling of air conditioners makes mandatory energy labelling of all air conditioners with the cooling capacity under 12 kW introduced on the European market after the 1st January 2013. The Directive defines for each function the energy class going from A+++ (more efficient) to G (less efficient). The classification is given in the following Table below.

Energy Efficiency Class	SEER	SCOP
<b>A+++</b>	SEER ≥ 8.50	SCOP ≥ 5.10
<b>A++</b>	6.10 ≤ SEER < 8.50	4.60 ≤ SCOP < 5.10
<b>A+</b>	5.60 ≤ SEER < 6.10	4.00 ≤ SCOP < 4.60
<b>A</b>	5.10 ≤ SEER < 5.60	3.40 ≤ SCOP < 4.00
<b>B</b>	4.60 ≤ SEER < 5.10	3.10 ≤ SCOP < 3.40
<b>C</b>	4.10 ≤ SEER < 4.60	2.80 ≤ SCOP < 3.10
<b>D</b>	3.60 ≤ SEER < 4.10	2.50 ≤ SCOP < 2.80
<b>E</b>	3.10 ≤ SEER < 3.60	2.20 ≤ SCOP < 2.50
<b>F</b>	2.60 ≤ SEER < 3.10	1.90 ≤ SCOP < 2.20
<b>G</b>	SEER < 2.60	SCOP < 1.90

## Appendix E. ECO-DESIGN FOR VRF > 12 KW

Commission Regulation (EU) 2016/2281 of 30 November 2016 implementing Directive 2009/125/EC of the European Parliament and of the Council establishing a framework for the setting of ecodesign requirements for energy-related products, with regard to ecodesign requirements for air heating products, cooling products, high temperature process chillers and fan coil units.

Minimum requirements ( $\eta_{sc}$ ) for cooling mode from the 1<sup>st</sup> January 2021:

Air-to-air air conditioners, driven by an electric motor, except rooftop air conditioners **189**

Minimum requirements ( $\eta_{sh}$ ) for heating mode from the 1<sup>st</sup> January 2021:

Air-to-air air heat pumps, driven by an electric motor, except rooftop heat pumps **137**

## Appendix F. CAMPAIGN SCHEDULE

For each surveillance test campaign (year n), the following schedule and deadlines shall be applied:

ECC asks for up-date of product list	01/12/n-1
Participant/applicant confirms up-date of products list	07/01/n
ECC sends preselection unit to test	01/02/n
Participant/applicant confirms preselection unit to test	15/02/n
ECC sends official selection of unit to test	28/02/n
Delivery + payment + TDS + starting procedure are completed	15/05/n
Auditors undertakes manufacturing facility visits	Between 01/06/n and 15/12/n
Diploma for test campaign n are valid until	15/09/n+1
ECC sends the Audit report	One week after the visit
The Laboratory carries out all first tests by	01/12/n
The Participant can ask for a second test up to	one month from reception of the test results
Delivery + submittal form + order/payment from participant are completed for second test(s)	one month after the request for a second test
The Laboratory carries out all second tests	15/03/n+1

## Appendix G. RE-RATING EXAMPLES

The following table contains examples of failures and application of the rerating rule

**Table 11: Cooling - EER**

Example 1 - EER				
Conditions	T°	Deviation	Passed / Failed	Rerate SEER with
A	35	-2%	P	EER <sub>A,declared</sub>
B	30			EER <sub>B,declared</sub> -12%
C	25	-12%	F	EER <sub>C,measured</sub>
D	20			EER <sub>D,delared</sub> -12%
Example 2 - EER				
Conditions	T°	Deviation	Passed / Failed	Rerate SEER with
A	35	-12%	F	EER <sub>A, measured</sub>
B	30			EER <sub>B, declared</sub>
C	25	-2%	P	EER <sub>C, declared</sub>
D	20			EER <sub>D, declared</sub>
Example 3 - EER				
Conditions	T°	Deviation	Passed / Failed	Rerate SEER with
A	35	-11%	F	EER <sub>A, measured</sub>
B	30			EER <sub>B,declared</sub> -12%
C	25	-12%	F	EER <sub>C, measured</sub>
D	20			EER <sub>D,delared</sub> -12%

**Table 12: Cooling - Other points**

Power consumption	Deviation	Passed / Failed	Rerate SEER with
P <sub>off</sub>		P	P <sub>off,declared</sub>
P <sub>sb</sub>		P	P <sub>sb,declared</sub>
P <sub>to</sub>	12%	F	P <sub>to, measured</sub>
P <sub>ck</sub>			P <sub>ck,declared</sub>

**Table 13: Heating - COP - Average climate**

Example 1 - COP				
Conditions	T°	Deviation	Passed / Failed	Rerate SCOP with
E	Tol			COP <sub>TOL,declared</sub>
F(T <sub>biv</sub> ≠ -7)	T <sub>biv</sub>	-11%	F	COP <sub>tbiv,measured</sub>
A	-7			COP <sub>A,declared</sub> -12%
B	2	-12%	F	COP <sub>B,measured</sub>
C	7			COP <sub>C,declared</sub> -12%
D	12			COP <sub>D,declared</sub> -12%
Example 2 - COP				
Conditions	T°	Deviation	Passed / Failed	Rerate SCOP with
E	Tol			COP <sub>TOL,declared</sub>
F(T <sub>biv</sub> ≠ -7)	T <sub>biv</sub>		P	COP <sub>tbiv,declared</sub>
A	-7			COP <sub>A,declared</sub>
B	2		P	COP <sub>B,declared</sub>
C	7			COP <sub>C,declared</sub>
D	12			COP <sub>D,declared</sub>

Example 2 - COP				
Conditions	T°	Deviation	Passed / Failed	Rerate SCOP with
E	Tol			COP <sub>TOL,declared</sub>
F (Tbiv = -7)	Tbiv	-11%	F	COP <sub>tbiv,measured</sub>
A	-7	-11%	F	COP <sub>A,declared</sub> -11%
B	2	-12%	F	COP <sub>B,measured</sub>
C	7			COP <sub>C,declared</sub> -12%
D	12			COP <sub>C,declared</sub> -12%

Table 14: Heating - Other points

Power consumption	Deviation	Passed / Failed	Rerate SCOP with
P <sub>off</sub>		P	P <sub>off,declared</sub>
P <sub>sb</sub>		P	P <sub>sb,declared</sub>
P <sub>to</sub>	12%	F	P <sub>to, measured</sub>
P <sub>ck</sub>			P <sub>ck,declared</sub>
Ph Tbiv	-12%	F	Ph <sub>Tbiv, measured</sub>

Table 15: Heating - COP - Colder climate

Example 1 - COP				
Conditions	T°	Deviation	Passed / Failed	Rerate SCOP with
E	Tol			COP <sub>TOL,declared</sub>
F(Tbiv ≠ -15)	Tbiv	-11%	F	COP <sub>tbiv,measured</sub>
A	-7			COP <sub>A,declared</sub> -12%
B	2			COP <sub>C,declared</sub> -12%
C	7			COP <sub>C,declared</sub> -12%
G	-15	-12%	F	COP <sub>B,measured</sub>

Example 2 - COP				
Conditions	T°	Deviation	Passed / Failed	Rerate SCOP with
E	Tol			COP <sub>TOL,declared</sub>
F (Tbiv = -15)	Tbiv	-11%	F	COP <sub>tbiv,measured</sub>
A	-7			COP <sub>A,declared</sub> -12%
B	2	-12%	F	COP <sub>B,measured</sub>
C	7			COP <sub>C,declared</sub> -12%
G	-15	-11%	F	COP <sub>C,declared</sub> -11%

Example 3 - COP				
Conditions	T°	Deviation	Passed / Failed	Rerate SCOP with
E	Tol			COP <sub>TOL,declared</sub>
F(Tbiv ≠ -15)	Tbiv		P	COP <sub>tbiv,declared</sub>
A	-7			COP <sub>A,declared</sub>
B	2		P	COP <sub>B,declared</sub>
C	7			COP <sub>C,declared</sub>
G	-15			COP <sub>D,declared</sub>

Table 16: Heating - COP - Warmer climate

Example 1 - COP				
Conditions	T°	Deviation	Passed / Failed	Rerate SCOP with
E	Tol			COP <sub>TOL,declared</sub>
F(Tbiv ≠ 2)	Tbiv	-11%	F	COP <sub>tbiv,measured</sub>
B	2	-12%	F	COP <sub>B,measured</sub>
C	7			COP <sub>C,declared</sub> -12%
D	12			COP <sub>D,declared</sub> -12%



Example 2 - COP				
Conditions	T°	Deviation	Passed / Failed	Rerate SCOP with
E	Tol			COP <sub>TOL,declared</sub>
F(Tbiv = 2)	Tbiv	-11%	F	COP <sub>tbiv,measured</sub>
B	2	-11%	F	COP <sub>B,declared</sub>
C	7			COP <sub>C,declared</sub>
D	12			COP <sub>D,declared</sub>

Example 3 - COP				
Conditions	T°	Deviation	Passed / Failed	Rerate SCOP with
E	Tol			COP <sub>TOL,declared</sub>
F(Tbiv = 2)	Tbiv		P	COP <sub>tbiv,declared</sub>
B	2		P	COP <sub>B,declared</sub>
C	7			COP <sub>C,declared</sub>
D	12			COP <sub>D,declared</sub>

Table 17: example of rerating when sound power level fails

Type of unit tested	BMG	Declared	Measured	Deviation	Rerated?	Rerated value	
Indoor unit	1	50	51	1	Y	LW <sub>I,measured</sub>	51
		52	-	-	-	LW <sub>I,declared</sub>	52
Outdoor	1	60	65	5	Y	LW <sub>O,measured</sub>	65
		58	-	-	Y	LW <sub>O,declared</sub> + LW <sub>O,deviation</sub> - 1	62

Table 18: Example of rerating SEER and SCOP

BMG	Model	Items	Declared	Calculated	Deviation	Rerated Value	
1	A	SCOP	3,8	3,18	-16%	3,18	
		Qhe	1750	1805	3%	1805	
	B	SCOP	3,9	-	-	SCOP <sub>declared</sub> x (1 - 0,16)	3,26
		Qhe	1780	-	-	Qhe <sub>declared</sub> x (1 + 0,03)	1833
	C	SCOP	3,7	-	-	SCOP <sub>declared</sub> x (1 - 0,16)	3,10
		Qhe	1700	-	-	Qhe <sub>declared</sub> x (1 + 0,03)	1751



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