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OPERATIONAL MANUAL
for the
CERTIFICATION
of
VARIABLE REFRIGERANT FLOW SYSTEMS

OM-15-2017

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I. PURPOSE

The purpose of this manual is to prescribe procedures for the operation of the Eurovent Certita Certification programme for Variable Refrigerant Flow systems (VRF) in accordance with the Certification Manual.

II. SCOPE

II.1 General

The Certification Programme for VRF applies to single module outdoor units used in cooling-only, heating-only and reversible Variable Refrigerant Flow systems and is divided in two sub-programmes:

- VRF1: Air-sourced VRF systems
- VRF2: Water-sourced VRF systems

It can be chosen to apply to one or another or both sub-programmes.

Heat recovery units are included in the scope but the heat recovery function is not certified.

High ambient systems are included in the scope as an option (because not sold on the European market) but tested under standard conditions as specified in Rating Standard RS 6/C/008.

Are excluded from the scope:

- Multiple module outdoor units
- VRF systems with data declared and published as combinations of outdoor(s) + indoor(s).

II.2 Certify all for outdoor units

The programme covers all VRF systems from standard production with a cooling and heating capacity in standard conditions as given in the table 1:

Table 1: Testing limits for certified units

| Capacity | Maximum number of connected indoor units | |
|--|--|----------|
| | Ducted horizontal | Cassette |
| ≤ 20 kW (in both modes) | 4 | 2 |
| 20 (in one mode) < P \leq 50 kW (in both modes) | 4 | - |
| 50 (in one mode) < P \leq 100 kW (in both modes) | 8 | 8 |

II.3 Requirements for indoor units

For each outdoor unit, the declaration of one range of cassette indoors units and one range of ducted indoor units is mandatory.

The indoor unit range must be clearly identified on the declaration list. Declaration of additional ranges of cassette or ducted indoor units is voluntary.

III. BASIC OUTLINE OF THE PROGRAMME

Participation in Eurovent Certita Certification programme for Variable Refrigerant Flow systems consists of the following:

III.1 Application

The Applicant, after signing the License Agreement, shall send to Eurovent Certita Certification all information required for the qualification according to the Rating Standard RS/6/C/008:

- *Declaration and combination files: form VRF-1A and VRF-1B (see APPENDIX B) with all models within the scope.*
- *Declaration of factories : form VRF-4 (see APPENDIX B.V)*

The Participant shall send the appropriate technical documentation (means “commercially available” as defined in Certification Manual. and/or public hyperlink) and Eurovent Certita Certification will check the accordance between the file of combination and this technical documentation.

III.2 Qualifying procedure

Eurovent Certita Certification proceeds to selection based on the declaration and combination files and requests to the selected units delivery to the laboratory. The independent laboratory staff proceeds to products performance testing on the selected units according to the procedure detailed in § IV.3.

In the meantime, an auditor appointed by Eurovent Certita Certification shall audit the manufacturing site chosen by Eurovent Certita Certification (see IV.6).

The certification is granted on condition that:

- *If the aforementioned checks prove all the ranges compliance with the requirements specified in Rating Standard RS/6/C/008,*
- *All the other requirements from the present Operational Manual are fulfilled,*
- *The audit has been performed by the auditor and is successful or the corrective actions plan is considered satisfactory,*
- *all fees have been settled.*

If not, the procedure for failure treatment shall be applied.

III.3 Repetition procedure

Every year, Eurovent Certita Certification checks whether the performance of the products still meet the requirements.

- *Repetition tests in independent laboratory shall be conducted annually in compliance with the Certification Schedule (see APPENDIX A)*
- *Units selected from regular production shall be tested in the independent laboratory selected by Eurovent Certita Certification.*

For the repetition procedure the certification is renewed at the date specified in the Certification Schedules (see APPENDIX A) on condition that:

- *The previous test campaign (N-1) has been successfully completed*
- *The audit scheduled during the previous campaign 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 and the payment have been completed*

The company receives than 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.4 Failure treatment

When the test results *or the audit results* fail to comply with the requirements of the relevant Eurovent Certita Certification Rating Standard the failure treatment shall be applied. (see IV.4 and IV.6e)

III.5 Complaint procedure

Under special conditions a complaint procedure may be carried out as described in the Certification Manual.

IV. OPERATION OF THE PROGRAMME

IV.1 Declaration of data

a. Rated performance data

All characteristics and performance items shall be expressed in SI Units. Maximum of 3 significant figures shall be used for Outdoor capacity, EER_{outdoor} , COP_{outdoor} and 2 significant figures for Sound power level.

b. Certification forms

Submittal for certification of models shall be sent by e-mail to Eurovent Certita Certification as .xls or .xlsx file.

Form VRF-1A will be used for the declaration of:

- outdoor models and its range,
- the ranges of combinable indoor units,
- data
- and mounting.

Each possible combination (Outdoor unit +Indoor units' ranges) has to be declared in accordance with the scope of the programme (Table 1). The mounting type (cassette or ducted) of indoor units shall be identified on the declaration file.

For models submitted by a private brand manufacturer (BN), the form will be used to identify the corresponding model number of the original equipment manufacturer.

Form VRF-1B will be used for declaring all the combinations of indoor units for every specific outdoor unit.

VRF-1B form must be completed for each different declared performance of each outdoor unit that the manufacturer has chosen to specify.

This form will indicate the limited quantity of combinations possible for test.

Each combination is composed by one outdoor unit (and its declared values) and associated indoor units:

- of the same mounting type: ducted horizontal or cassettes, (4-way, round flow or multi flows), no mix is allowed.
- within the same mounting type (ducted or cassette) of the same indoor units range.
- If a system capacity ratio of $100 \pm 5\%$ can be reached : the number of indoors as described in Table 1 shall be used all with the same size of indoor units
- if a system capacity ratio of $100 \pm 5\%$ with the same size indoor units cannot be reached: sizes as similar as possible with the number of indoor units as close as possible but not more than the prescribed number in Table 1 shall be used to meet the system capacity ratio within $100 \pm 5\%$
- duct horizontal with $ESP_{nom} \geq 25 \text{ Pa}$

Eurovent Certita Certification will check that the indoor unit combinations defined by the manufacturer in VRF-1B are the possible ones from the strict application of the combination rules taking into account the declared ranges of indoor units from VRF-1A.

All the possible combinations coming from the indoor units series included in VRF-1A must be included in VRF-1B form. Indeed, VRF-1B cannot be a partial declaration from the indoor unit series of the ones included in VRF-1A.

Technical Data Sheet and Additional Information Form: for models selected for test, Form VRF-2 has to be completed with technical description of all components along with declared data. Form VRF-3 shall also be completed and sent to Eurovent Certita Certification with a procedure explaining how to start the unit and to reach the proper frequency of the motor and including a contact person the laboratory can reach in case of problem.

Reporting of test result: for models tested, Form VRF-5 is sent by Eurovent Certita Certification, showing the deviations between claimed and measured data.

Response form after failure: For models which failed the test, Form VRF-6 is sent by Eurovent Certita Certification, showing the list of products affected by the failed test.

c. Reporting of models

Certified ratings for certification and publication on the Eurovent Certified Performances website shall be given only for outdoor units. The range of indoor units and their mounting type shall also be published on the ECP website.

Optional devices or accessories which are used to obtain the ratings of the basic unit assembly and which affect the ratings shall be included in the certification data. Systems having coils with both horizontal and vertical orientation, when ratings are different, shall be certified to reflect the capacity and efficiency ratings for both positions.

Besides current models, the Participants shall provide Eurovent Certita Certification with the list of:

- new models,
- deleted models,
- obsolete models.

d. **Basic model group**

Each Participant declaration list will be grouped in Basic Model Groups (BMG). The basic model group shall be defined by single module Outdoor units which are essentially the same in terms a rated capacity (5%) and function (cooling/ heating/ heat recovery) and the same or comparable in terms of basic components, specifically: fans, coils, expansion devices, compressors and motors.

Single-phase and three-phase outdoor models can belong to the same BMG, but are two different models.

IV.2 Selection of units to be tested

Within the programme, tests may be conducted under the following procedures:

- Scheduled tests in qualifying procedure
- Scheduled tests in repetition procedure
- Penalty tests
- Complaint tests

a. **Number of units to be tested**

Eurovent Certita Certification shall select outdoor models on the basis of its evaluation of an Applicant's declaration to establish suitable criteria of types and sizes to be tested. The number of outdoor units to be tested each year per participant shall be as follows:

- 8% (rounded up, at least 1) of the number of the listed basic model groups for each subscribed sub-programmes (VRF1 / VRF2).

- Example:

15 BMG for Air-sourced units → 2 Units to test

4 BMG for Water-sourced units → 1 Unit to test

Indeed, 3 units to test: 2 Air-sourced units and 1 Water-sourced unit.

b. **Number and type of indoor units to be tested**

For each outdoor unit with a rated capacity ≤ 100 kW selected by Eurovent Certita Certification for test, Eurovent Certita Certification shall select also among the possible combination declared in the Form VRF-1B, indoor units references to supply for the test.

c. **Tested points**

Regular tests:

- Thermal performances *at rating standard conditions* of the outdoor unit
- Sound Power level of the outdoor unit
- Power input and airflow (only for ducted) for the indoor units

“After testing” verification on units:

- Weight
- Dimensions of the casing (L x l x h)
- Airflow (could be check before regular tests)
- Number of rows and lines of the indoor heat exchanger
- Refrigerant type and charge

These kinds of verification are carried out once per manufacturer. In case of failure, see *IV.4b*.

d. Acquisition of unit

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

If units, technical forms, starting procedures and orders are not delivered within the time limits specified in the notification received from Eurovent Certita Certification, it is considered as non-application of procedures (see Certification Manual dedicated chapter).

e. Selection and Shipment

Selected units shall be obtained either from the Participant production line or a stocking point, and then delivered to the Laboratory. Following completion of the tests, the Participant shall arrange for the shipment of the model.

All units with a rated capacity ≤ 100 kW (in both modes) shall be tested in an independent laboratory (approved and under contract with Eurovent Certita Certification).

The Laboratory shall have the responsibility of un-crating, handling, testing and re-crating the unit for shipment.

A contact person shall be designated by the Participant to organise the shipment to the laboratory, the laboratory shall inform him when the test is completed.

All transport fees shall be covered by the participant. The laboratory shall not engage any transport fees.

A trial testing campaign for seasonal performances for cooling and heating modes is organized during 2017 campaign following decisions taken from all compliance committee meetings held in 2016. (cf.Minutes from 29 september 2016)

IV.3 Tests at the laboratory

a. General

Units shall be installed in the test facility in accordance with the Participant published installation instructions. The Participant will provide the laboratory/test agency with full information about the installation, including at least the following items:

- any adjustment of the fan speeds (change of connector, switches, etc.);

- 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.);
- standard air flow rate referred to standard air (air density = 1,204 kg/m³) for ducted units;
- exact location of the refrigerant piping, and position of distributor(s);
- minimum refrigerant piping length between the outdoor unit and each indoor unit (as indicated in the installation manual);
- any other information necessary to the correct installation of the unit.

The laboratory/test agency shall install and check out the units. The procedures used shall be in accordance with the Participant installation, start-up and service instructions.

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

Only very simple reparations can be performed by the laboratory. For other repair, a technician of the Participant shall be also present.

If the unit cannot be repaired, it shall be replaced by the Participant within 8 weeks.

It is highly recommended that a technician of the Participant be present at the laboratory to check the installation of the sample before starting the tests. Participant personnel are allowed to attend the setting-up and the starting of the unit but not the test itself and are not permitted in the laboratory test room facility.

If the test establishes a failure of the unit to meet one or more of the requirements of the Standard, the Laboratory or the independent agency shall promptly notify Eurovent Certita Certification. Eurovent Certita Certification or the Laboratory shall immediately contact the Participant regarding any further actions desired by the participant.

If the participant representative is still in the vicinity of the testing facility he is allowed to attend the dismantling of the unit.

When the unit is tested in an independent laboratory, the Participant shall inform Eurovent Certita Certification if he wants to attend the start-up, and the laboratory shall inform the Participant about the date the unit will be installed. Participant may review test results immediately after the test.

b. Report of tests results

Upon completion of the tests on each unit, the Laboratory will render its complete report as pdf file to Eurovent Certita Certification. Eurovent Certita Certification will send a copy of the report together with test result (Form VRF-5), and re-rating proposal (Form VRF-6) to the Participant.

c. Recovery of the unit

The Participant shall notify Eurovent Certita Certification within 4 weeks after receiving the test report if he intends to recover the tested unit. In case he doesn't, Eurovent Certita Certification will order the laboratory to dispose of the units and

invoice the participant the disposal fee (the certificate of disposal shall be issued to the participant).

The laboratory will prepare the unit for recovery, using as far as possible the original packing materials. If refrigerant has to be recovered prior to the collection, due to transport regulations, this will be done and a certificate from an authorized intallator will be issued.

The Participant has to recover its unit within 8 weeks after receiving the corresponding test report.

IV.4 Failure treatment

a. Component failure

If any functional component is inoperative, or the unit is damaged and cannot be repaired and tested at the Laboratory, the unit is considered as a “component failure”. The complete test shall then be carried out on the repaired unit or the new unit from the same basic model group. The new unit shall then be delivered within 8 weeks.

b. “After testing” verification failure

If one or several features “after checking” of the first unit are failed, the test results are rejected for the unit, and one compliant unit shall be delivered within 8 weeks. If it fails again, then another selected model of the campaign is verified.

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

c. General

If the value found by testing in the independent laboratory differs from the declared value by more than the acceptable tolerance (see Eurovent Certita Certification Rating Standard 6/C/008), the Participant has 4 weeks after notification of failure to select one of the following alternatives:

- Re-rate the products in accordance with the re-rating rules.
- Ask for a second test on the same unit.
- Ask for a second test on another unit of the same model selected by Eurovent Certita Certification.

d. Re-rating rules

The tested outdoor units shall be re-rated according to the test results and the following rules:

- In case of failure on efficiency only or capacity only, the power input of the outdoor unit shall be recalculated for all models in the same basic model group.
- In case of failure on efficiency or capacity, the efficiency and or capacity for all models in the same basic model group and shall be rerated by the deviation.
- For the outdoor sound power level, the tested outdoor unit shall be re-rated in accordance with the test result but, in addition, all outdoors in the same basic model group shall be re-rated by the deviation value minus 1 dB.

e. Second test

The Participant can ask for a second test on the same combination. The Participant may review test results after the first test and the test set-up prior to the second test as described above. During this test the Participant may be present to witness, but is not allowed to participate or interfere.

- If the second test is performed on the same combination (without any modification on the outdoor and indoor unit(s), and not leaving the laboratory), the Participant can choose to repeat only:
 - ♦ All thermal and pressure measurements
 - or
 - ♦ All sound measurements
- If the Participant had shipped back the combination, the complete test shall be carried out.

f. Penalty tests

If, during the test of one combination, more than one deviation exceeds the tolerance (see Rating Standard), one penalty test is asked.

An additional unit will be selected for the next test campaign in case of high deviation (see Rating Standard).

Penalty tests following a qualifying procedure need to be defined before the certification is granted.

IV.5 Repeated failures along the test campaigns

This paragraph refers to Article 102 of the Certification Manual Edition 12th.

The rules regarding Mean Value of Failure (MVF) are described in APPENDIX C.

IV.6 Factory audits

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 (Technical Data Sheet) have been provided to Eurovent Certita Certification.

b. General

Manufacturer will declare to Eurovent Certita Certification which factory (ies) are involved in the production of VRF systems in the same time as manufacture provide the updated declaration list.

Based on that, Eurovent Certita Certification will determine the site for audit and advise the audit agency.

Note: for the auditors 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 Eurovent Certita Certification by standards and agreements which he has signed), can take part to the audit. The holder is systematically informed by Eurovent Certita Certification of the presence of this observer prior to the audit.

The audits shall be ordered by Eurovent Certita Certification. The audit costs shall be paid by the manufacturer to Eurovent Certita Certification.

Manufacturer will declare to Eurovent Certita Certification any change in relation with VRF systems production: New plants, transfer of production ... etc.

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 audit shall be complete in one day.

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

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

c. Verification of physical data

- model number from nameplate;
- check exterior dimensions;
- check motor nominal capacity;
- check fan type (brand and model), material, power input, number of blades;
- Weight
- Dimensions of the casing (L x l x h)
- Airflow & Available pressure of indoor coil
- Number of rows and lines of the indoor heat exchanger
- Refrigerant type and charge
- Any physical parameter involved in the performances of the unit.

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 Eurovent

Certita Certification. Eurovent Certita Certification Technical Department shall communicate audit conclusions and report to the manufacturer.

In case of *non-conformity*, the manufacturer shall send within twenty working days after the transmission of the Audit Report any mitigating circumstances to Eurovent Certita Certification Technical Department. 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 Eurovent Certita Certification.
- that, while not jeopardizing a substantial participation in the Certification Program, 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 Program.

Audit *non-conformities*

The following audit *non-conformities* can be reported:

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.

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 Eurovent Certita Certification evidence: The label used in Technical or Commercial documentation is not according to Certification Manual..
- If not solved from previous audit, a *non critical non-conformity* becomes a *critical non-conformity*.

e. **Failure treatment**

In case of *non-conformity*, Eurovent Certita Certification shall initiate the appropriate failure treatment procedures. The outcome of the failure treatment procedures may be that the *participant* 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 Eurovent Certita Certification the corrected documentation or figures within 1 month.

Moreover, the participant is notified by Eurovent Certita about its loss of points according to § VIII.4 of Certification Manual.

- In case of violation of rules, the participant is suspended *temporarily*.

f. **Non-application of procedures**

In case of non-application of procedures, the Participant shall be notified by Eurovent Certita Certification that his company name and associated complete list of products will be withdrawn from the website, within one month, *during suspension period* (see Certification Manual for more details).

V. **PROMOTION OF THE PROGRAMME**

This section refers to section VI of the Certification Manual.

V.1 **By Eurovent Certita Certification**

The certified data of the certified products are published on our website: www.eurovent-certification.com.

Eurovent Certita Certification will supply, on request, to any interested party, the current status of any Participant or of any model (new, deleted or obsolete).

The following information pertaining to each model certified shall be published on the website for VRF:

- Name of Company
- Trade or brand name of model
- Model number or designation of the outdoor unit
- Name of indoor unit range(s)
- Total Outdoor cooling capacity at design condition
- Total Outdoor heating capacity at design condition
- Effective power input (cooling and heating) at design condition
- Outdoor EER and COP at full load conditions
- A-weighted outdoor side sound power
- A-weighted sound power radiated from the duct (ducted units)
- Refrigerant line
- Main Power Supply
- Refrigerant fluid.
- Mounting type

Performance data shall be given at the nominal fan speed.

By default, each participant of the present programme is also a participant of the European Heat Pumps (Euro HP) programme for all products certified under the present programme and falling under the scope of the Euro HP Operational Manual (OM-17-2016). European

Heat Pumps certification may however be limited by the participant to specific ranges or models, using the relevant Declaration list; it may also be refused by the participant for all his products, using a waiver to be signed and sent out to Eurovent Certita Certification.

V.2 By Participants

Please refer to the Certification Manual.

APPENDIX A. Certification schedule and timeframes

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

| | |
|--|---|
| Eurovent Certita Certification asks for up-date of product list | 15/10/n-1 |
| Participant confirms up-date of products list | 31/10/n-1 |
| Website updated (with list validated by Participant 1 week before) | 30/11/n-1 |
| Eurovent Certita Certification sends selection list for test | 15/11/n-1 |
| The Participant confirms selection list | 30/11/n-1 |
| <i>TDS + payment + starting procedure are completed + audit is scheduled</i> | 15/03/n |
| <i>Delivery</i> | 30/04/n (≤ 50 kW) |
| | 31/05/n (> 50 kW) |
| Auditors undertakes manufacturing facility visits | Between 15/04/n and 30/09/n |
| Diploma for test campaign n are valid until | 31/07/n+1 |
| Eurovent Certita Certification sends the Audit report | One week after the visit |
| The Laboratory carries out all first tests by | 30/11/n |
| Eurovent Certita Certification sends the test reports | 5 days after reception of the laboratory report |
| The Participant can ask for a second test up to | one month after reception of the test results |
| Delivery + TDS + payment + starting procedure are completed for second test(s) | one month after the request for a second test |
| The Laboratory carries out all second tests | 28/02/n+1 |

APPENDIX B. FORMS

B.I. Form VRF-1A: Declaration file by Original Equipment Manufacturer

| | Label | Description | Unit |
|---------|-------------------------------|---|-------|
| GENERIC | Product Number | (see Certification Manual) | - |
| | Master product number | | |
| | Tested on | | |
| | Rated on | | |
| | Created on | | |
| | Last update on | | |
| | Status | | |
| | Participant Name | | |
| | Product Name | | |
| | Trade Name | | |
| | Type of product | | |
| | Range Name | | |
| BMG | | | |
| THERM | P _{Cout} | Outdoor Cooling Capacity | kW |
| | EER _{out} | Outdoor Energy Efficiency Ratio | - |
| | Ph _{out} | Outdoor Heating Capacity | kW |
| | COP _{out} | Outdoor Coefficient of Performance | - |
| SOUND | LwO env | A-weighted sound power level outdoor unit (non ducted) | dB(A) |
| | LwO duct | A-weighted sound power level outdoor unit (ducted) | dB(A) |
| GENERAL | Inverter | Inverter | - |
| | MPS | Main Power Supply Voltage (V) - Phase - Frequency (Hz) | - |
| | Refrigerant | Refrigerant. E.g.: R410A, R407C. | - |
| | Capacity Control | Fixed, Staged, variable | - |
| | Compressor Type | Scroll, Screw, Reciprocating, Centrifugal | - |
| | Compressor motor type | AC, AC Inv, DC inv.. | - |
| | Outdoor Heat Exchanger Type | Plate, micro channel, finned tube... | - |
| | Outdoor Heat Exchanger Width | Outdoor Heat Exchanger Width | mm |
| | Outdoor Heat Exchanger Length | Outdoor Heat Exchanger Length | mm |
| | Outdoor Heat Exchanger Height | Outdoor Heat Exchanger Height | mm |
| | Outdoor unit Weight | Outdoor unit Weight | kg |
| | Nb of rows of the Outdoor HE | Nb of rows of the Outdoor Heat Exchanger | - |
| | Nb of lines of the Outdoor HE | Nb of lines of the Outdoor Heat Exchanger | - |
| | Range(s) of indoor units | Range name(s) of indoor units | - |
| | Mounting type of indoor unit | One mounting type for the indoor units [ducted or cassette] | - |
| | | | |
| | | | |
| | | | |

B.II. Form VRF-1B: Example of Combination file by Original Equipment Manufacturer

| | PC _{out} | EER _{out} | ... | Indoor Unit combinations | | Air flow | IU Dimensions |
|----------------|-------------------|--------------------|-----|--------------------------|-----------------------|----------|---------------|
| Outdoor Unit 1 | X.X | Y.Y | ... | 1 | 2x CAS1-(size1) XYZ | A.A | D x D x D |
| | | | | 2 | 4x DUCT1-(size1) XYZ | B.B | E x E x E |
| | | | | ... | ... | ... | ... |
| | | | | n | 4x DUCTn-(size 2) XYZ | C.C | F x F x F |
| | X.X | Z.Z | ... | ... | ... | ... | ... |
| Outdoor Unit 2 | Q.Q | R.R | ... | ... | ... | ... | ... |
| Outdoor Unit 3 | ... | ... | ... | ... | ... | ... | ... |

B.III. Form VRF-2: Technical Data Sheet

Technical Data Sheet shows all information of Declaration file, to which will be added:

| | Label | Description | Unit |
|---------------------------------|---|---|-------------------|
| GENERAL | Unit Length | Unit length | mm |
| | Unit Height | Unit height | mm |
| | Unit Width | Unit width | mm |
| | Total Charge | Total charge | kg |
| | Weight of the Outdoor Unit | Outdoor Unit weight | kg |
| | Attendance | According to OM-1 Chapter IV paragraph c rules [true/false] | - |
| | Compressor Manufacturer | Compressor manufacturer | - |
| | Compressor Model | Compressor model | - |
| | Contact Name | Contact name | - |
| | Contact Title | Contact title | - |
| | Expansion Device Location | Expansion device location [outdoor/indoor] | - |
| | Expansion Device Type | Expansion device type | - |
| | Heating Mode Minimum Temperature | Heating mode minimum temperature | °C |
| | Mounting of the Indoor Units | Mounting of the indoor units | - |
| | System capacity ratio | System capacity ratio | - |
| | Indoor 1 Name | Name | - |
| | Indoor 1 Heat Exchanger Type | Plate, micro channel, finned, shell- and-tube | - |
| | Indoor 1 Heat Exchanger Width | Indoor Heat Exchanger Width | mm |
| | Indoor 1 Heat Exchanger Length | Indoor Heat Exchanger Length | mm |
| | Indoor 1 Heat Exchanger Height | Indoor Heat Exchanger Height | mm |
| | Indoor 1 Heat Exchanger Weight | Indoor 1 Heat Exchanger weight | kg |
| | Indoor Coil 1 Air Flow | Air flow rate indoor coil | m ³ /s |
| | Indoor Coil 1 Available Static Pressure | Available pressure indoor coil | Pa |
| | Indoor Coil 1 Length | Indoor coil 1 length | mm |
| | Indoor Coil 1 Height | Indoor coil 1 height | mm |
| | Indoor Coil 1 Width | Indoor coil 1 width | mm |
| | Indoor Coil 1 Fan Motor Type | Fan motor type (DC INV, AC INV, AC LARGE SLIP) | - |
| | Indoor Coil 1 Fan Type | Fan type | - |
| | Indoor Coil 1 Fin Spacing | Fin spacing | - |
| | Indoor Coil 1 Fin Type | Fin type | - |
| | Indoor Coil 1 Number of Fan | Number of fans | - |
| Indoor Coil 1 Number of Circuit | Number of circuits | - | |

| | | |
|--|---|-------------------|
| Indoor Coil 1 Number of Row | Number of rows | - |
| Indoor Coil 1 Tube Pitch | Tube pitch | mm |
| Indoor Coil 1 Row Pitch | Row pitch | mm |
| Indoor Coil 1 Tube Outside Diameter | Tube outside diameter | mm |
| Indoor Coil 1 Tube Type | Tube type | - |
| Indoor Coil 1 Number of Rows | Indoor Coil 1 Number of Rows | - |
| Indoor Coil 1 Number of Lines | Indoor Coil 1 Number of Lines | - |
| Indoor 2 Name | Name | - |
| ... | | |
| Indoor Coil 2 Tube Type | Tube type | - |
| Indoor 3 Name | Name | |
| ... | | |
| Indoor Coil 3 Tube Type | Tube type | - |
| Indoor 4 Name | Name | - |
| ... | | |
| Indoor Coil 4 Tube Type | Tube type | - |
| Outdoor Coil Air Flow Rate | Air flow rate outdoor coil | m ³ /s |
| Outdoor Coil Available Static Pressure | Avialable Pressure outdoorcoil | Pa |
| Outdoor Coil Length | Coil length | mm |
| Outdoor Coil Height | Coil height | mm |
| Outdoor Coil Width | Coil width | mm |
| Outdoor Coil Fan Type | Fan type | - |
| Outdoor Coil Fin Spacing | Fin spacing | mm |
| Outdoor Coil Fin Type | Fin type | - |
| Outdoor Coil Number of Circuit | Number of circuits | - |
| Outdoor Coil Number of Fan | Number of fans | - |
| Outdoor Coil Number of Row | Number of rows | - |
| Outdoor Coil Tube Pitch | Tube pitch | mm |
| Outdoor Coil TRow Pitch | Row pitch | mm |
| Outdoor Coil Tube Outside Diameter | Tube outside diameter | mm |
| Outdoor Coil Water Flowrate Heat mode | Outdoor coil water flow rate heating mode | m ³ /s |
| Outdoor Coil Fan Motor Type | Outdoorcoil fan motor type | - |
| Outdoor Coil Tube Type | Outdoorcoil tube type | - |
| Refrigerant Line Outside Ø (liquid) | Refrigerant line outside diameter liquid (split system) | mm |
| Refrigerant Line Outside Ø (vapour) | Refrigerant line outside diameter vapour (split system) | mm |
| Remote Control Box | Remote control box [true/false] | - |
| Water Cooled Condenser Manufacturer | Manufacturer | - |
| Water Cooled Cond. Pump Included | Pump included [true/false] | - |
| Water Cooled Condenser Reference | Water cooled condenser reference | - |
| Water Cooled Condenser Type | Water cooled condenser type | - |
| Water Flow Rate Outdoor Coil at 30°C | Water flow rate outdoor coil at 30°C | m ³ /s |
| Water Flow Rate Outdoor Coil 30/35 °C | Water flow rate outdoor coil at 30/35 °C | m ³ /s |

B.IV. Form VRF-3: Start Up Procedure Form

ADDITIONAL INFORMATION FORM

This form is to be completed for inverter AND non-inverter models.

| | |
|-------------|--|
| Test Number | |
| Model | |

1. Participant technical contact person

In order to be able to quickly solve starting-up problems, the laboratory needs to have data of a technical contact. Please fill the table below.

| | |
|-----------------------------|--|
| Name | |
| Telephone number | |
| E-mail address / fax number | |

2. Fan speeds and compressor frequencies

The following data will help the laboratory to check that the unit is running in TEST MODE. It is highly recommended to fill the table below for inverter models.

| | Model | Fan speed [rpm] | | Compressor frequency [Hz] | |
|---------------|-------|-----------------|---------|---------------------------|---------|
| | | Cooling | Heating | Cooling | Heating |
| Outdoor Unit | | | | | |
| Indoor Unit 1 | | | | | |
| Indoor Unit 2 | | | | | |
| Indoor Unit 3 | | | | | |
| Indoor Unit 4 | | | | | |

3. Has the laboratory to apply a specific start-up procedure to achieve the rated capacities? (No test will be performed without answer to this question)

YES | NO

4. Start-up procedure for standard rating conditions

Note: Once frequencies and expansion valves opening are fixed, no further changes will be allowed until test completion.

If answer to clause 3 is YES, a detailed start-up procedure shall be attached to this form.

VERY IMPORTANT: If a start-up procedure is attached, it shall be drafted with enough details to ensure the laboratory personal will be able to set the unit at the first try. In particular, special care shall be given to the following items:

- Initial state of the following items (before starting the configuration):
 - wired/remote controller model status(ON or OFF)
 - appliance status (ON or OFF)
 - mode (cooling, heating, ventilation, auto, etc.)
 - room temperature range requirements (if yes, please specify clearly), temperature requirements cannot be closer than ± 2 K from the rating conditions.

In addition:

- Indicate if the remote controller shall be configured with the indoor unit(s) receiving or not the signals from the remote controller.
- When entering TEST MODE, indicate if the appliance will give a feedback (acoustic or visible) to acknowledge the setting.
- Indicate the louver position, and the method to reach it. If necessary, a drawing may be useful.
- For multisplit systems, please clearly specify if the starting procedure has to be performed for all indoor units at the same time, or in which order.

5. Time before beginning of the measurement period

Please note that the measurement period will begin 60 min (cooling mode) or 70 min (heating mode) after starting the unit. **This means that the unit shall be running in TEST MODE by that time.**

6. Default start-up procedure for standard rating conditions

When there are no details on start-up supplied with the units, the normal start-up procedure used by the laboratory will be as follows:

COOLING CAPACITY TESTING AND SOUND POWER DETERMINATION

Configuration of the remote controller:

- Mode: Cooling mode*
- Temperature set: Minimum allowed by remote controller without including special modes like LOW temperature function.
- Fan speed: Maximum allowed by remote controller without including special modes like TURBO mode.
- Louver: Maximum airflow position**

HEATING CAPACITY TESTING

Configuration of the remote controller:

- Mode: Heating mode*
- Temperature set: Maximum allowed by remote controller without including special modes like HIGH temperature function.
- Fan speed: Maximum allowed by remote controller without including special modes like TURBO mode.
- Louver: Maximum airflow position**

*Any other functions, like eco mode, display backlighting, ionizer, etc will be kept as default after inserting the batteries in the remote controller or switching the power on for wired remote controllers.

**The louver position for maximum airflow is only checked visually so there is a risk not to exactly be in the maximum airflow position.

Contacts in CEIS laboratory:

Ms Pilar Garcia – pgarcia@ceis.es

Mr Julio CONDE – jconde@ceis.es

B.V. Form VRF-4: Factory Declaration

PARTICIPANT / APPLICANT: name of company

| | Name of the factory | Complete address | Country | Production (Outdoor unit / Indoor unit / Ranges / all products) | Already visited for other Eurvent certita Programme (NF PAC...) |
|---|----------------------------|-------------------------|----------------|---|--|
| 1 | | | | | |
| 2 | | | | | |
| 3 | | | | | |
| 4 | | | | | |
| 5 | | | | | |
| 6 | | | | | |
| 7 | | | | | |

B.VI. Form VRF-5: Test result form

| 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: Variable Refrigerant Flow System Date of reception of the unit: Date of reception of test report: Unit tested on: | | | | | | | | |
| RESULT DETAILS | | | | | | | | | | |
| | | | | | Measurement | | MFV | | High failure | |
| APPLICATION | Thermal | Measured | Declared | Deviation | Limit | Result | Limit | Result | Limit | Result |
| P _{cool} outdoor | kW | | | | -0.08 | | 0.12 | | 0.12 | |
| EER _{outdoor} | - | | | | -0.10 | | 0.12 | | 0.12 | |
| P _{heat} outdoor | kW | | | | -0.05 | | 0.12 | | 0.12 | |
| COP _{outdoor} | - | | | | -0.08 | | 0.12 | | 0.12 | |
| P _{cool} outdoor | kW | | | | | | | | | |
| P _{heat} outdoor | kW | | | | | | | | | |
| APPLICATION | Acoustic | | | | Limit | Result | Limit | Result | Limit | Result |
| L _w env | dB(A) | | | | 0 | | 3 | | 3 | |
| TEST CONCLUSION | | | | | | | | | | |
| | | | | | Test | | MFV | | High failure | |
| | | | | | | | | | | |

B.VII. Form VRF-6: Re-rate form

| PROPOSAL OF RERATE | |
|--------------------|--|
| GENERIC | Rerate key: Created on: Last update on: Status: |
| MANUFACTURER | Participant key: Participant name: |
| TEST | Test key: Unit tested on: |

APPLICATION Thermal

| DECLARED | | | | | | | | | | | | | | |
|-------------|--------------|-----------------|------------|-----|----------|----------|----------|----------|--|--|--|--|--|--|
| Product key | Product name | Type of product | Range name | BMG | Perf 1.1 | Perf 1.2 | Perf 1.3 | Perf 4.4 | | | | | | |
| | | | | | | | | | | | | | | |
| RERATED | | | | | | | | | | | | | | |
| | | | | | | | | | | | | | | |

APPLICATION Acoustic

| DECLARED | | | | | | | | | | | | | | |
|-------------|--------------|-----------------|------------|-----|----------|--|--|--|--|--|--|--|--|--|
| Product key | Product name | Type of product | Range name | BMG | Perf 2.1 | | | | | | | | | |
| | | | | | | | | | | | | | | |
| RERATED | | | | | | | | | | | | | | |
| | | | | | | | | | | | | | | |

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| LEGEND | | | |
|-----------|------------|--------------|----------------|
| Code | Name | Product type | Component type |
| Perf. 1.1 | EERoutdoor | | |
| Perf. 1.2 | COPoutdoor | | |
| Perf. 1.3 | Pacoutdoor | | |
| Perf. 1.4 | Pahoutdoor | | |
| Perf. 2.1 | LwO env | | |

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APPENDIX C. Calculation method and implementation of MVF

C.I. General

Refer to Certification Manual.

Mean Value of Failure (MVF) is equal, for each manufacturer, to the ratio between the total number of measurements above the “High deviation limit” (see table below) and the total performed measurements in the considered years.

$$\text{MHFV} = \frac{\sum \text{Number of measurements failed with high deviation}}{\sum \text{Number of measurements performed}}$$

Mean High Failure Value Number of considered years Number of considered years

When there is a second test on a unit, then the first measurements are not taken into account.

A manufacturer is *suspended* from the Eurovent Certita Certification programme for one year if, for at least one considered characteristic, the mean value of MVF is higher than the limits.

Current failure treatment (re-rating and additional tests) still applies above the tolerance (see IV.4).

| Test campaigns to be considered | | | Qualifying test campaign + first repetition test campaign or last three testing campaigns if available |
|---------------------------------|----------------|----------------------|--|
| Performance item | Tolerance | High deviation limit | Limits for being expelled z MHVF > ... |
| Pc | See RS 6/C/008 | | > 30 % |
| Ph | | | > 50 % |
| EER | | | > 30 % |
| COP | | | > 50 % |
| Lw | | | > 50 % |

C.II. Notification of being *suspended*

A participant who is going to be *suspended* will receive a notification from Eurovent Certita Certification, with a possible additional selected unit to be tested. The purpose of this additional test is to give the participant the opportunity to comply with the limits. The response to Eurovent Certita Certification 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.