

# TECHNICAL CERTIFICATION RULES OF THE EUROVENT CERTIFIED PERFORMANCE MARK



## IT COOLING UNITS

Identification: ECP-23 ITCU

Revision 2 – 12/2023

(This version cancels and replaces any previous versions)

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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 IT COOLING UNITS (ITCU), in accordance with the Certification Manual.

Modifications as against last version:

No.	Modifications	Section	Page
1	Addition of the information that any certified chiller in LCPHP programme can be published in ITCU upon LCPHP participant	I.1.1	5
2	Addition of optional application at W20/30 for CRAH units	A.II.1	25
3	Increasing the dT for CRAH units for non-standard conditions	A.II.2	26

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# I. GENERAL INFORMATION

## I.1. Scope

### I.1.1. General

The programme scope covers IT Cooling Units specifically designed and used to regulate air temperature and optionally air humidity of an enclosed space containing critical equipment such as IT equipment or telecommunication equipment.

The IT Cooling technologies considered in the scheme are Computer Room Air Conditioners Direct Expansion (CRAC) including:

- Split CRAC units, air source (CRAC-A-S)
- CRAC units, water source (CRAC-W)

and Computer Room Air Conditioner Chilled Water (CRAH).

HYBRID technologies pairing these technologies are also covered by the scope. The detailed list of technology types considered are listed in Table 1 below.

Are excluded from the scope:

- Packaged CRAC air cooled units
- Multi-Split units
- Partial IT Cooling units without any fan

The IT cooling units must be factory made units designed as a single packaged unit or a single split unit. Units must be operating at a frequency units of 50 Hz, 60 Hz declaration is optional. The units can also be ducted or non-ducted, on the return or supply air side. Return or supply air within the floating floor is considered as a duct.

Three air flow **configurations** of cooling are covered:

- ROOM Based Cooling unit
- ROW Based Cooling Unit
- RACK Based Cooling Unit

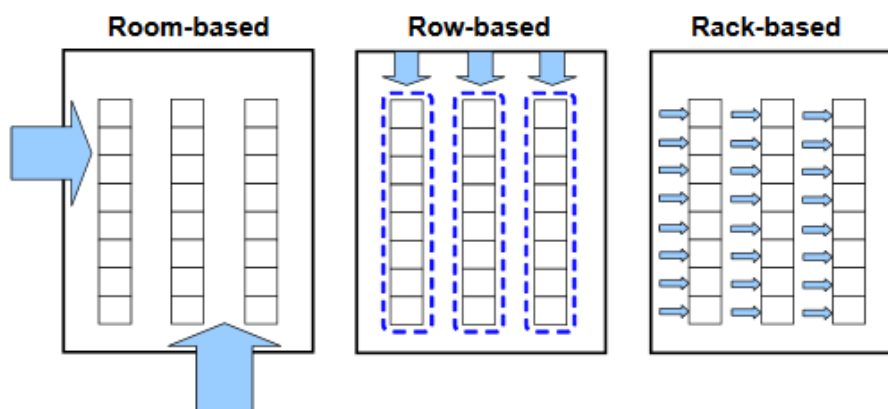


Figure 1 Air flow configurations

The air flow **direction** (with all possible **fan positions**, down-flow **up**, etc.) can be:

- Down-flow
- Up-flow
- Horizontal-flow

The different cooling technology types considered in the scope are listed below:

**Table 1 Technology types**

Technology type	Features	Key Components
CRAC-A-S unit	<ul style="list-style-type: none"> <li>• CRAC unit</li> <li>• Air source</li> <li>• Single split unit only</li> </ul>	Internal and external part considered: <ul style="list-style-type: none"> <li>• Condenser</li> <li>• Evaporator</li> <li>• Compressor</li> <li>• Evaporator Fan</li> <li>• Condenser Fan</li> <li>• Refrigerant pump</li> </ul>
CRAC-W unit	<ul style="list-style-type: none"> <li>• CRAC unit</li> <li>• Water source</li> <li>• Single packaged unit</li> </ul>	<ul style="list-style-type: none"> <li>• Evaporator</li> <li>• Compressor</li> <li>• Evaporator Fan</li> <li>• Heat exchanger</li> <li>• Refrigerant pump</li> </ul>
CRAH unit	<ul style="list-style-type: none"> <li>• CRAH unit</li> <li>• Single packaged unit</li> </ul>	<ul style="list-style-type: none"> <li>• Fan</li> <li>• Coil</li> </ul> Double CRAH configurations with 2 coils are also considered in this technology type
Hybrid CRAH/CRAC-A-S unit	<ul style="list-style-type: none"> <li>• CRAC and CRAH unit</li> <li>• Air source for CRAC</li> <li>• Single split unit</li> </ul>	Internal and external part considered: <ul style="list-style-type: none"> <li>• Condenser</li> <li>• Evaporator</li> <li>• Compressor</li> <li>• Evaporator Fan</li> <li>• Condenser Fan</li> <li>• Refrigerant pump</li> <li>• Coil</li> </ul>
Hybrid CRAH/CRAC-W unit	<ul style="list-style-type: none"> <li>• CRAC and CRAH unit</li> <li>• Water source for CRAC</li> <li>• Single packaged</li> </ul>	<ul style="list-style-type: none"> <li>• Evaporator</li> <li>• Compressor</li> <li>• Evaporator fan</li> <li>• Refrigerant pump</li> <li>• Heat exchanger</li> <li>• Coil</li> </ul>

### **Publishing the Chillers on ITCU Programme Website**

*The process chillers certified under LCPHP Programme of ECC, upon request of LCPHP Programme Participants, may be published in the ITCU Programme, on condition that the units concerned are able to operate at the standard rating conditions of the ITCU Programme for CRAH units and can be selected in the certified selection tool in LCPHP Programme.*

#### **I.1.2. Certification principle**

The certification scope of the programme is per commercial range that is/are chosen by the applicant or participant.

#### **I.2. Certified performances**

Certified performance items:

- Net Total Cooling Capacity
- Net Sensible Cooling Capacity
- Power input

- Net EER
- nSHR
- Air flow rate of the unit
- Water pressure drop
- A-weighted sound power: indoor side, radiated by duct, outdoor side

For SASO option;

- Net Total Cooling Capacity
- Power input
- NsensCOP - Net sensible coefficient of performance
- Operability at 52°C (if the unit is declared under SASO option)

### **I.3. Definitions**

In addition to the definitions specified in the Certification Manual, the following definitions apply:

#### **I.3.1. Computer Room Air Conditioner with Direct Expansion (CRAC)**

IT Cooling unit using dedicated electrically driven compressors and refrigerant cooling coils.

#### **I.3.2. Computer Room Air Handler with Chilled Water (CRAH)**

IT Cooling Unit using water coils for cooling without any dedicated compressors nor refrigerant cooling coils.

#### **I.3.3. Down-flow**

Air passes vertically downward through cooling coil. Return air enters the top of the unit and supply air leaves at the bottom or the front of the unit.

#### **I.3.4. Horizontal-flow**

Air passes horizontally through a cooling coil. Return air enters the rear of the unit and supply air leaves from the front or the lateral side of the unit.

#### **I.3.5. Up-flow**

Air passes vertically upward through a cooling coil. Return air enters from the bottom or front of the unit and supply air leaves at the top of the unit.

#### **I.3.6. Unit air flow rate**

Air flow rate given for conditions specified in form ITCU-2 (TDS).

#### **I.3.7. Single packaged unit**

Factory assembly of components of a refrigeration system designed to be installed together and suitably fixed on a common mounting to form a single unit.

#### **I.3.8. Single split unit**

Factory assembly of components of refrigeration system fixed on two mountings to form a discrete matched functional unit.

### **I.3.9. Net total cooling capacity<sup>1</sup> (P<sub>c</sub>)**

The heat given off from the heat transfer medium to the unit per unit of time, calculated as per EN 14511-3:2022 subclause B.3, and expressed in kW.

### **I.3.10. Net sensible cooling capacity<sup>1</sup> (P<sub>s</sub>)**

The sensible heat given off from the heat transfer medium to the unit per unit of time, calculated as per EN 14511-3:2022 subclause B.3, and expressed in kW.

### **I.3.11. Energy efficiency ratio (EER)**

Ratio of the net total cooling capacity to the power input of the unit, expressed in Watt/Watt.

$$EER = \frac{P_C}{P_E}$$

### **I.3.12. Net sensible heat ratio (nSHR)**

Ratio of the net sensible cooling capacity to the net total cooling capacity, expressed in Watt/Watt.

$$nSHR = \frac{P_S}{P_C}$$

### **I.3.13. Power input (for CRAC units)**

Average electrical power input of the unit within the defined interval of time, expressed in kW, obtained from the addition of:

- power input for operation of the compressor
- power input for all control and safety devices of the unit;
- Power input of the fan (internal and external fan when present)

### **I.3.14. Power input (for CRAH units)**

Total electric power absorbed by the unit, including fan(s) and auxiliary devices but excluding any electrical resistance heater. Power input of CRAH units do not include pump contribution, calculated as defined in EN 14511-1:2022

### **I.3.15. Non-standard unit**

Unit that has a change on any component that can influence the performances, i.e. fans, compressor, coils.

### **I.3.16. System unit**

CRAC air cooled split unit with external part (condenser).

The present codification is used in the scheme:

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<sup>1</sup> When the unit is declared to SASO, these performances shall be declared as per SASO 2874:2016 and ANSI/ASHRAE 37:2009.



Table 2 Codification of unit specifications

Air flow configuration	Code
Computer Room Air Conditioner	CRAC
Computer Room Air Handler	CRAH
Heat rejection	Code
Air Cooled	A
Water Cooled	W
Mounting	Code
Single packaged unit	P
Single Split unit	S
Air flow direction	Code
Down-flow	D
Up-flow	U
Horizontal-flow	H
Air flow configuration	Code
Room based cooling	RM
Rack based cooling	RK
Row based cooling	RW

### I.3.17. Basic Model Group (BMG)

A Basic Model Group is a group of IT Cooling models with the same:

- Technology type
- Nature of components, specifically, the fans, coils, compressors and motors
- Fan position
- Refrigerant if present
- Number of circuits
- Mounting
- Range name
- Flow configuration
- Footprint
- Installation (with or without floating floor)

Units from the same Basic Model Group can have:

- Different flow direction
- Different performances

Examples:

An ITCU/CRAC/A/S, **room** based, up-flow unit does not belong to the same BMG than an ITC/CRAC/A/S, **row** based, up-flow unit. The technology type is different.

An ITCU/CRAC/A/S, room based up-flow unit with a modulating power compressor doesn't belong to the same BMG than an ITCU/CRAC/A/S, room based, up-flow unit with no modulating power compressor. The nature of compressor is different

### I.3.18. Model

A model is an IT Cooling unit with the same:

- Technology type
- Components, specifically fans, coils, compressors and motors
- Refrigerant if present

- Mounting
- Range name
- Flow configuration
- Flow direction
- Net Total Cooling Capacity (Pc)
- Frequency

Example:

A product called COOL is sold in an OEM catalogue with a flow direction of up-flow or down-flow and with or without power modulation. This product is sold under a same product name but with a different flow direction (up-flow or down-flow) and nature of component (with or without an inverter). In that case, this product counts for 4 models:

- COOL up-flow with modulating power
- COOL up-flow without any modulating power
- COOL down-flow with modulating power
- COOL down-flow without any modulating power

#### I.4. Contributors

The lists of contributors are given for information and may be modified by ECC (EUROVENT CERTITA CERTIFICATION) whenever necessary.

##### I.4.1. Audit body

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

<b><u>EUROVENT CERTITA CERTIFICATION SAS</u></b>	✉ : 34 Rue Laffitte 75009 Paris FRANCE	☎ : +33 1 75 44 71 71
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##### I.4.2. Independent laboratory / test body

When the checks carried out involve product tests, these are performed at the request of ECC by the following laboratories, known as Independent laboratory:

<b><u>CEIS : Centro de Ensayos Innovación y Servicios</u></b>	✉ : Cr. de Villaviciosa de Odón a Móstoles, Km. 1,5 28935 Móstoles (Madrid) SPAIN	☎ : +34 916 169 710
<b><u>TÜV NORD Systems GmbH &amp; Co. KG</u></b>	✉ : Buildings Testing, Am TÜV 1, 45307, Essen GERMANY	☎ : +49 201 825-3204

As described in the Appendix D and by fulfilling the conditions given in APPENDIX D, the participants can use their own laboratory for testing purposes. The following independent laboratory is responsible for this option.

<b><u>IMQ S.p.A. : Istituto Italiano del Marchio di Qualità</u></b>	✉ : HVACR Testing Laboratory, Via Jacopo Linussio 1 33020 Amaro (Udine) ITALY	☎ : +39 0433 468607
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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 technical appendix and in the product and test standards. The applicable standards are as follow (non-exhaustive list):

For CRAC technologies:

- **EN 14511:2022 - 4 parts** : Air conditioners, liquid chilling packages and heat pumps for space heating and cooling and process chillers, with electrically driven compressors.
- **EN 12102-1:2022** : Air conditioners, liquid chilling packages, heat pumps, process chillers and dehumidifiers with electrically driven compressors - Determination of the sound power level - Part 1: Air conditioners, liquid chilling packages, heat pumps for space heating and cooling, dehumidifiers and process chillers.

For CRAH technologies:

- **EN 1397:2021** : Heat exchangers. Hydronic room fan coil units. Test procedures for establishing the performance
- **EN 16583:2022**: Heat exchangers. Hydronic room fan coils units. Determination of the sound power level

For both type of units:

In addition to the EN standards, the following ASHRAE standards shall be applied when needed, specifically for the External Static Pressure, as in the EN14511 testing standard, a minimal length of duct is required to measure the pressure. The minimal height is linked to the surface outlet of the duct, and can exceed operational laboratory limits. For such cases, an alternative set-up is used following requirements from ANSI/ASHRAE 127-2020 Appendix A.

Laboratories must specify clearly in the test report each time the ASHRAE standards are used:

- **ANSI/ASHRAE Standard 127-2020**: Method of Testing for Rating Computer and Data Processing Room Unitary Air Conditioners
- **ASHRAE Standard 37 - 2009**: Methods of Testing for Rating Electrically Driven Unitary Air-Conditioning and Heat Pump Equipment
- **SASO 2874:2016**

### II.2. Specific requirements and quality management

Production identification and traceability:

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.

Use of mark logo

The participant shall respect the marking requirements of the present certification manual and of the Technical certification rules if the logo is used on its products and/or services on all the relative documentations

Production instruction documentation

The applicant/participant shall ensure the availability of documented information that defines the characteristics of the products to be produced and/or the activities to be performed and the results to be achieved when appropriate

## Management of customer claims

Customer claim and their treatment related to certified products shall be done, recorded and maintained available.

### **II.3. Marking**

It is highly recommended that the participating company indicates participation in the EUROVENT CERTIFIED PERFORMANCE (ECP) programme for IT COOLING UNITS by the following means.

#### **II.3.1. Display of Eurovent Certified Performance logo on production units**

The provisions of the Certification Manual apply.

#### **II.3.2. Display of Eurovent Certified Performance logo on technical documentation**

The provisions of the Certification Manual apply.

## **III. CERTIFICATION PROCESS**

### **III.1. Admission procedure**

#### **III.1.1. Declaration of data**

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

The Applicant, after signing the Certification Agreement, shall send to ECC all information required for the qualification: software name and version, the software itself, declaration file and relevant literature.

All characteristics and performances shall be expressed in SI units. Declared values shall be expressed with:

- a maximum of 1 significant digit after the coma (e.g., 10.2 kW) for capacities
- a maximum of 2 significant digits after the coma for efficiencies (net EER and net SHR)
- 0 significant digits after the coma for sound power levels, pressure drop and unit air flow

Submittal of data shall be made by filling in the forms provided by ECC as .xls or .xlsx files. The forms shall be sent by e-mail to ECC within the time limits specified in Certification Schedule (see Appendix – Campaign schedule, if applicable).

Copies of the forms are part of this Technical Certification Rules (see Appendix B):

- Declaration file ITCU-1 will be used
  - for manufacturing companies (Original Equipment Manufacturer – OEM) to declare ranges, Basic Model Groups (BMG), performance ratings and technical data.
  - for Brand Name (BN) companies to identify the corresponding model's number of the original equipment manufacturer
- Technical data sheet ITCU-2 will be used to complete technical description of all raw material or incoming goods for the units selected.
- Software name and version

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

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

Once the application is completed, the admission procedure is articulated as follows:

- For Brand Name (BN) companies, applicable steps of the software checking procedure and audit procedure shall be conducted (see III.1.3.4 and III.1.3.1)

- For Original Equipment Manufacturers (OEM), ECC checks the software compliance to general (see Certification Manual) and specific (see III.1.3.4.a) requirements and its consistency with the declaration file ITCU-1 provided by the applicant. Then, ECC proceeds to selection (see III.1.3.2) based on the declaration file ITCU-1 and software. The independent laboratory staff proceeds to product performance testing on the selected units according to the procedure detailed in III.1.3.3. A “test-check” (see III.1.3.3.d) is then performed by ECC to evaluate the test success. In the meantime, an auditor appointed by ECC shall audit each manufacturing site (see III.1.3.1).

If the aforementioned checks prove all the ranges compliance with the requirements specified in the technical Appendix and that all other requirements from the present document are fulfilled, the certification is granted. If not, the procedure for failure treatment shall be applied.

When certified, the ranges are published on the Eurovent Certified Performance (ECP) website. Once the certificate is received, the participant is entitled to use the certification mark according to applicable requirements (see II.3).

### **III.1.3. Implementation of checking operations**

The provisions of the Certification Manual apply.

#### **III.1.3.1. Initial admission audit**

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

##### **a. General**

General audit requirements are stated in the Certification Manual.

The audit will consist of the on-site checking of software (see III.1.3.4.c) and the verification that the applicable requirements specified in paragraph III.1.3.1 are fulfilled. The duration of the site audit is a full working day. This duration can be adjusted in the case of carrying out a joint audit with other certifications. The audits shall be performed annually. The number of audits per applicant/participant is limited to one per year, no matter how many factories/facilities the applicant/participant has. All factories/facilities of the OEM/Brand Name must be declared to ECC. ECC has the liberty to choose in which Factory/Facility the audit will be performed. For Brand Names, ECC shall be allowed to perform the audit in the BN's facilities or in the OEM's factories.

Whenever necessary, ECC has the right to ask an auditor to conduct an additional audit to the applicant/participants' factory as well as to collect data directly from customer and perform extra checking of software.

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

In case of force majeure (e.g. accidents, labour disputes, natural events, acts of war) which would not allow ECC to perform a factory audit ECC can decide to replace it by another mean of verification, to postpone it within a reasonable deadline or to cancel it.

##### **b. Audit requirements**

During the audit, the auditor will:

- check that the ECP mark is displayed on the production units and on the documentation in compliance with the requirements specified in paragraph II.3;
- check the operating software consistency as per paragraph III.1.3.4.c;
- check that the products in the sales record and/or production line and/or stock are compliant with the declaration file ITCU-1 and Technical Data Sheet;

For OEM, in case the products under manufacturing at the audit date do not fall into the certification programme scope, the auditor shall at least check the stock to verify that the raw material or incoming goods under common use in the factory are the same as that appearing in the declaration file ITCU-1 and technical datasheet.

- It is priority to check the units selected by ECP for the laboratory tests are compliant with the declaration file ITCU-1 and Technical Data Sheet, if not possible, the auditor shall randomly check at least as many certified units as selected which are available in the production line, storage. In case of no possibility to perform a physical check, the auditor can perform an imaginary check on unit(s) which have been sold in last six months by using the official documents of the auditee which may support, to see the used components for the audited units
- check that the corrective actions plan is completed or under implementation.

The auditor will also perform a complete review of the quality management system to check that:

- the suppliers are regularly evaluated and that the corresponding evaluations are recorded;
- the raw material or incoming goods are controlled at their reception;
- the products conformity with the bill of material (BOM) specifications is regularly evaluated and the corresponding evaluations are recorded;
- the factory personnel is qualified to perform the specific tasks if any;
- every product traceability is ensured;
- calibration of measuring devices is performed on a regular basis;
- production non-conformities are recorded and corrective actions initiated;
- customer complaints are registered and treated;

### c. Audit non-conformity

After evaluation, a non-conformity is classified as critical when, on the basis of objective evidence, the following cases are identified:

- there is a significant risk to the product conformity with respect to specified requirements;
- there is a significant risk regarding the quality management system ability to control the product conformity to specified requirements;
- there is systematic or repeated non-conformity to a specified requirement;

Otherwise the non-conformity is classified as not-critical. In case of non-conformity, the applicant/participant shall be requested to provide ECC with a corrective actions plan within the deadline specified by the auditor for the audit failure treatment procedure).

### d. Audit failure

The applicant/participant shall resolve the non-conformity within the time limitation agreed in the corrective actions plan. In case of critical non-conformity, the certification may be suspended/not granted until the critical non-conformity resolution and the corresponding verification.

#### III.1.3.2. Selection of units to be tested

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

ECC shall select units to be tested based on its evaluation of the declaration file ITCU-1 communicated by the applicant.

The number of units tested is indexed on the number of 50 Hz and 60 Hz models (N) as illustrated in Table 3. Hybrids models are not considered in the counting of N. The total number of units tested (options included) shall not exceed 4 but shall be at least above or equal to 1.

**Table 3 Number of tested units**

<b>N</b>	<b>Number of units tested</b>
$N \leq 200$	1
$200 < N \leq 400$	2
$400 < N < 800$	3
$800 < N$	4

- If the applicant/participant decides to certify 60 Hz units, at least one unit test shall be done at 60 Hz. If N requires one test, 60 Hz option requires one additional unit test.
- If the applicant/participant decides to certify his water cooled CRAC units CRAC-A-W as well, **then the models will be added to the total number of models N and the number of units tested will be defined according to the Table 3.**

If the applicant/participant decides to certify his units under optional standard conditions defined in part A.II.1, then **an additional thermal test point will be performed among the optional standard conditions declared.** Only one thermal test point shall be performed on the selected units, regardless the number of options declared.

ECC shall select and test the units considering the following rules:

- Two selected units cannot belong to the same BMG
- Units are all tested considering the standard operating conditions point
- ECC can chose to replace the acoustic testing point by a non-standard operating condition testing point.

This rule applies for CRAC/A/S system units only if the second thermal point selected does not require the delivery of a different external part.

- ECC will select the units on the basis of the declaration file ITCU-1 and the selection software communicated by the participant/applicant.

Example: An industrial has 600 models (50 Hz model). According to the rules, 3 units will be selected. ECC chooses for two units to replace 2 acoustic tests by 2 non-standard operating condition tests as described in Table 4 below.

**Table 4 Units testing points**

	Thermal Testing point		Acoustic testing point (standard)
	Standard operating condition	Non-standard operating condition	
<b>Unit 1</b>	X		X
<b>Unit 2</b>	X	X	
<b>Unit 3</b>	X	X	

When selection is done on the software, ECC shall send the printout of the selected unit to the participant/applicant. Participant/Applicant shall then fill in the Technical Datasheet ITCU-2 of the selected unit and communicate it to ECC.

### **SASO option**

If the applicant/participant decides to certify units under SASO option, under the conditions given in A.II.3, then ECC shall select and test the units considering the following rules:

**Table 5 Testing points for high ambient units**

Type of unit	Flow configuration	Thermal conditions		
		Class 1 (as given in A.II.3)	Class 2 (as given in A.II.3)	Class 3 (as given in A.II.3)
Air cooled	Down-Flow Unit		X	
	Up-Flow Unit – Ducted		X	
	Up-Flow Unit – Non-Ducted	X		
	Horizontal Flow			X
Water cooled	Down-Flow Unit		X	
	Up-Flow Unit – Ducted		X	
	Up-Flow Unit – Non-Ducted	X		
	Horizontal Flow			X

Only the units below 100 kW are eligible to the SASO option. CRAC/A/S units below 40 kW are excluded from this option. In addition, the operability shall be declared at 52°C.

Selected units shall be delivered before the deadline specified in the APPENDIX C by and under the responsibility of the applicant/participant to the laboratory responsible for performing the tests.

### III.1.3.3. Tests at the independent laboratory

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

All units covered by the laboratory scope defined in Table 6 below shall be tested at full load condition in an independent laboratory selected and approved by ECC. Units out of the laboratories' scope shall be tested in part load conditions (i.e. not at the nominal point of functioning of the unit but at a lower regime within the capacities of the laboratory) in an independent laboratory selected and approved by ECC. In that case, part load test procedure detailed in part III.1.3.3 shall be applied.

**Table 6 Laboratory scope**

<b>For CRAC/A, CRAC/W, CRAH units</b>	<b>TUV NORD</b>	<b>CEIS</b>	<b>Units out of laboratory scope</b>
Net total Cooling Capacity (kW)	≤ 120 kW	≤ 100 kW	Net Total cooling capacity > 100kW <b>and</b> Unit Airflow > 22 000 m3/h
Unit air flow rate (m3/h)	≤ 22000 m3/h	≤ 44 000 m3/h	
Fluid flow rate	≤ 20 500 kg/h	≤ 40 000 kg/h	-

The laboratory shall have the responsibility of un-crating, handling, testing, and re-crating the unit. 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. ECC will contact the applicant to give instructions regarding further actions.

Laboratory shall communicate to ECC its uncertainties of measurement and make sure that they are consistent with the acceptance criteria and standards. Uncertainties of measurement can be communicated to applicant/participant on demand.

The laboratory shall not perform the test and contact ECC:

- one of the information is not compliant with the technical datasheet (see technical appendix),
- one of the units appears damaged

Units shall be assembled and installed in the test facility by the laboratory personnel in accordance with the manufacturer's installation instructions. The applicant/participant shall therefore provide the laboratory with full information about the installation.

Upon request the applicant/participant's staff is allowed by ECC to attend the installation of the unit, the start-up of the unit and its stabilization but not the test itself. Applicant/participant's staff shall not disturb the test.

If the test establishes that the unit fails to meet one or more of the requirements of the APPENDIX A Technical annexes the laboratory shall promptly notify ECC to receive instructions regarding further actions (see III.1.3.3).

#### **a. Part load testing procedure for units out of laboratory scope**

Unless the participant/applicant has their own laboratory, which is approved by ECC and capable of performing the tests of the selected unit that is out of the independent laboratory scope, then the unit will be tested under its part load condition with the following procedure:



**Table 7 Part load procedure**

<b>Step</b>	<b>Action</b>
<b>1</b>	ECC selects a unit out of the scope of the independent laboratory
<b>2</b>	ECC generates with the OEM's software the printout of the unit but under a part load condition, e.g. for a unit airflow and cooling capacity within the maximum air flow and capacity of the independent laboratory. ECC has the freedom to choose any part load condition within the independent laboratory's scope.
<b>3</b>	The unit is tested under the selected part load condition in the independent laboratory
<b>4</b>	Test report is compared to the printout. If the test is passed, then the full load and part load performances are validated. If the test is failed, failure treatment applies with the following rerating rule: If the OEM choses to rerate his unit, then the measured relative deviation (in %) is applied to the unit's full load performances and part load performances (in the certified software).

### **b. Time limitation of acquisition and recovery of units**

The provisions of the Certification Manual apply.

Deadline for delivery of units to the laboratory, together with the technical data sheet completed and the payment, is defined in the Certification Schedule (see APPENDIX C). For the qualifying procedure, the deadline is specified in the notification received from ECC. If elements are not delivered within the time limitations, it is considered as non-application of procedures.

ECC has discretion not to discontinue the certification when the applicant/participant provides a definite and acceptable date of supply.

The applicant/participant has to recover the products maximum four (4) working weeks after receiving the test reports and results. If the products are not recovered after this delay, the laboratory can destroy them and the corresponding invoice will be sent by ECC to the applicant/participant.

### **c. Test conditions**

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

### **d. Report of test results and test-check**

Upon completion of the tests on each unit, the laboratory will send the complete report as a .pdf file to ECC.

In addition of the results of the tests, the test report shall include the following elements:

- External Static Pressure (ESP) levels and protocols followed by the laboratory to perform the measurements
- Photo of the installed unit, especially photo with ducts and floating floor when applicable
- Drawings of the installation with positions of sensors, especially position of pressure sensors and temperature sensors

ECC shall verify that the test protocols used by the laboratory complies with those indicated in the APPENDIX A, especially for those concerning the External Static Pressure measurement.

ECC shall recalculate the values with the software according to the test operating conditions displayed in the test report ("test-check").

For each test, a performance item fails when the recalculated value and the measurement differ by more than the allowable acceptance criterion (see APPENDIX A). When one or more performance items fail, the test status is considered FAILED and the failure treatment corresponding to unit failure (see III.1.3.3.e) shall be applied.

ECC will forward a copy of the report together with the test report result sheet (ITCU-4). The participant/applicant shall respond to ECC by choosing one of the two following steps:

- Ask for a second test, i.e. on another copy of the same unit
- Rerate the software in line with the test results

## e. Failure treatment

### e1. Reason of failure

The applicant/participant may examine the reasons of the failure.

### e2. Initial test failure

If the unit is damaged this is considered as a “component failure”. The laboratory shall immediately inform ECC who will notify the applicant/participant. The applicant/participant shall deliver within four (4) working weeks a new copy of the same model, which then shall be tested according to the availability of the laboratory.

### e3. Unit failure

For each failed test, the applicant/participant has four (4) working weeks from the notification of failure to select between the following alternatives:

- Rerate the data as indicated in part e6
- Ask for a second test on a new copy of the same unit scheduled by ECC according to the availability of the laboratory. This request shall be accompanied by a cause analysis and a relevant corrective action plan. If this second test is successful, no revision of selection software or catalogues will be required, otherwise the data will have to be rerated following rerating procedure (see e6).

### e4. High deviation and penalty test

For each failure above high deviation in net cooling capacity or net EER an additional test shall be scheduled for the next test campaign. High Failures on several performances in the same test lead to one penalty test.

The penalty tests are full tests and shall be performed during the next repetition test campaign, in addition to scheduled repetition tests. The number of penalty tests is limited to 1 (one) penalty test.

ECC shall select units for penalty tests from the BMG which failed. If this BMG is no longer produced in year N+1 (status “deleted” or “obsolete”) then the selection will be made from the BMG which is the most similar to the one that failed.

### e5. Mean deviation and Mean Value of Failure (MVF)

This section deals with the rules regarding Mean Value of Failure (MVF) and refers to the corresponding Appendix of the Certification Manual (Repeated failures along the test campaigns).

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

$$MVF = \frac{\sum_N \text{number of measurements failed}}{\sum_N \text{number of measurements performed}} \quad N = \text{number of considered years}$$

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

- Net cooling capacity
- Net Energy Efficiency Ratio (EER)
- Sound power levels

There is a failure regarding MVF if the deviation measured is greater than the mean value given in 0. 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 year if the MVF is strictly higher than 25%. Data of new participants will be first taken into consideration after two test campaigns (including qualifying tests).

A manufacturer that leaves the programme and re-joins some years later is considered to be a newcomer if they re-join after three years. If they re-join before, all the latest existing test campaigns are considered, with minimum two and maximum three. The same rule applies if the manufacturer has been excluded for one year.

## e6. Rerating procedure

General Rerating procedure requirements are stated in the dedicated paragraph of the Certification Manual. Participant/Applicant shall rerate units according to the following rules:

**Table 8 Rerating rules**

Unit tested	Rerating perimeter	Rerating rule
Standard unit tested in standard rating conditions	<ul style="list-style-type: none"> <li>All units from the same BMG on the OEM catalogue/Declaration List and the tested point in software.</li> </ul>	Rerate by adapting the catalogues and software to the test results.
Standard unit tested in non-standard rating conditions	<ul style="list-style-type: none"> <li>The tested unit on the software</li> </ul>	Rerate by adapting the software to the test results.
Standard unit tested in part load conditions	<ul style="list-style-type: none"> <li>The tested unit on the software at part load conditions and full load conditions</li> </ul>	Rerate by adapting the software to the test results.

The corrected software with its new version number shall be sent to ECC who will check the consistency of the modifications. In particular, ECC will verify that when a rerate is done on a unit for a specific testing point, the other tested points of the same unit are not affected, or if so, they stay inside the allowed acceptance criterion.

If the new software is in accordance with all the measurements, the ranges are published on the ECP website with the new rating and certification is granted/maintained. After verification ("test-recheck"), if the software is still not in accordance with the test results the certification shall be temporarily suspended until the software update proves consistency with the tests results.

For the SASO tests, the same acceptance criteria in Table 18 are applied. When required, the rerate is applied only to the tested model. As of 2023 campaign, all concerned models in SASO product type will be rerated with the rules in Table 8. As the net EER and net SHR are linked to the other values by the following formulas, a readjustment is done to keep consistency between the values.

$$EER = \frac{P_c}{P_E} \text{ and } SHR = \frac{P_s}{P_c}$$

The absolute deviation between the measured value  $X_{meas}$  and the recalculated value  $X_{recal}$  is calculated as follows:

$$\Delta_{abs} = X_{meas} - X_{decl}$$

For acoustic sound power level rerate is done as followed. Re-rated values will be rounded up to stay consistent with the correct number of significant digits defined.

$L_w$	Tested Model	Other units from same rerating perimeter
	$L_{w_{rerated}} = L_{w_{measured}}$	$L_{w_{rerated}} = L_{w_{declared}} + \Delta_{abs}$

Deviation considered in Table 9 is a relative deviation (in %) between the measured value  $X_{meas}$  and the declared value  $X_{decl}$ . It is calculated as follow:

$$\Delta_{rel} = (X_{meas} - X_{decl}) / X_{decl}$$

Rerating is applied on the other performances as follow:

**Table 9 Rerating rules**

EER	nSHR	$P_c$	$P_s$	$P_E$	Tested Model	Other units from same rerating perimeter
					$P_{C_{rerated}} = P_{C_{measured}}$ $EER = EER_{declared}$ $SHR = SHR_{declared}$ $P_{E_{rerated}} = \frac{P_{C_{measured}}}{EER_{declared}}$ $P_{S_{rerated}} = P_{C_{rerated}} * SHR$	$P_{C_{rerated}} = P_{C_{declared}} * (1 + (\Delta_{rel} + 3\%))$ $EER = EER_{declared}$ $P_{E_{rerated}} = \frac{P_{C_{rerated}}}{EER_{declared}}$ $SHR = SHR_{declared}$ $P_{S_{rerated}} = P_{C_{rerated}} * SHR_{declared}$
					$P_c = P_{C_{declared}}$ $EER_{rerated} = \frac{P_{C_{measured}}}{P_{E_{measured}}}$ $P_{E_{rerated}} = \frac{P_{C_{declared}}}{EER_{rerated}}$	$P_c = P_{C_{declared}}$ $EER_{rerated} = EER_{declared} * (1 + (\Delta_{rel} + 3\%))$ $P_{E_{rerated}} = \frac{P_{C_{declared}}}{EER_{rerated}}$
					$P_c = P_{C_{declared}}$ $SHR_{rerated} = \frac{P_{S_{measured}}}{P_{C_{measured}}}$ $P_{S_{rerated}} = P_{C_{declared}} * SHR_{rerated}$	$P_c = P_{C_{declared}}$ $SHR_{rerated} = SHR_{declared} * (1 + (\Delta_{rel} + 3\%))$ $P_{S_{rerated}} = P_{C_{declared}} * SHR_{rerated}$
					$EER = EER_{declared}$ $P_{C_{rerated}} = P_{C_{measured}}$ $SHR_{rerated} = \frac{P_{S_{measured}}}{P_{C_{measured}}}$ $P_{S_{rerated}} = P_{S_{measured}}$ $P_{E_{rerated}} = \frac{P_{C_{measured}}}{EER_{declared}}$	$EER = EER_{declared}$ $P_{C_{rerated}} = P_{C_{declared}} * (1 + (\Delta_{rel} + 3\%))$ $SHR_{rerated} = SHR_{declared} * (1 + (\Delta_{rel} + 3\%))$ $P_{S_{rerated}} = P_{C_{rerated}} * SHR_{rerated}$ $P_{E_{rerated}} = \frac{P_{C_{rerated}}}{EER_{declared}}$
					$EER_{rerated} = \frac{P_{C_{measured}}}{P_{E_{measured}}}$ $P_{C_{rerated}} = P_{C_{measured}}$ $SHR = SHR_{declared}$ $P_{S_{rerated}} = P_{C_{rerated}} * SHR_{declared}$ $P_{E_{rerated}} = P_{E_{measured}}$	$EER_{rerated} = EER_{declared} * (1 + (\Delta_{rel} + 3\%))$ $P_{C_{rerated}} = P_{C_{declared}} * (1 + (\Delta_{rel} + 3\%))$ $SHR = SHR_{declared}$ $P_{S_{rerated}} = P_{C_{rerated}} * SHR_{declared}$ $P_{E_{rerated}} = \frac{P_{C_{rerated}}}{EER_{rerated}}$

	Test passed
	Test failed

### III.1.3.4. Software checking procedure

#### a. Specific requirements

In addition to the general software requirements which are described in the dedicated appendix of Certification Manual, the software must comply with the following:

- If the technical selection is protected by a username and/or password these shall be provided to the ECC representative. In case it has an expiry date, applicant/participant shall communicate the username and/or password to ECC as soon as it is renewed.
- Vocabulary and units shall be in accordance with the present Technical Certification Rules
- Air side properties are defined by either dry bulb and wet bulb or dry bulb and humidity ratio.
- Inputs boundaries shall be implemented in the software and an alert message shall appear when the inputs selected are out of the possible conditions permitted by the manufacturer. If this requirement is not fulfilled, manufacturer have 12 (twelve) months to implement it in his software.
- It should be possible in the software to select the following inputs and to display the following outputs. The wording and the units shall be the same as defined below. If the wording differs, the mandatory wording shall at least appear in brackets. The printouts shall display the following inputs and outputs.
- All certified units shall be available in the software. When any market option is selected by the participant for a range, this range may be excluded from the software scope on condition that it is not mandatory in the selected market-related standard which are given in Section II.1.1.

**Table 10 Software wording**

<b>Mandatory inputs</b>	<b>Mandatory Input or Output</b>	<b>Mandatory Outputs</b>
Preferred wording: Unit inlet air temperature (°C) Alternative accepted wording: <ul style="list-style-type: none"> <li>• Air Inlet Temperature (°C)</li> <li>• Indoor room dry bulb temperature (°C)</li> </ul>	Compressor modulation (%) (if applicable)	Net total cooling capacity (kW)
Unit inlet air relative Humidity (%)	Water outlet temperature (°C) and/or Water flow (l/s)	Net sensible cooling capacity (kW)

<b>Mandatory inputs</b>	<b>Mandatory Input or Output</b>	<b>Mandatory Outputs</b>
Supply Airflow (m³/h) or Unit Airflow (m³/h)		Power Input (kW)
ESP or External Static Pressure (Pa)		Net EER
Condensing Temperature (°C) only if no outdoor unit is provided and/or Outdoor air temperature (°C)		A-weighted sound power level inside side (dB) and A-weighted sound power level inside duct (dB)
Altitude (m) or sea level (m)		Unit Water Pressure loss or Unit Water Pressure drop (kPa)
Water inlet temperature (°C)		nSHR

## **b. Acquisition and initial check of the software**

The software shall be sent together with all required data when the applicant subscribes for the qualification procedure. For the repetition procedure, the deadline for the delivery of the software to ECC is defined in the Certification Schedule (see APPENDIX C).

The software compliance to general (see dedicated chapter in the Certification Manual) and specific (see a) requirements is to be checked by ECC prior to selection.

Brand Name companies shall also send the operating version of the software to ECC to check the consistency with the OEM software version.

In case only in-house programmes are available, a person designated by ECC shall undertake himself the selection on site, during a specific visit for BN companies or the factory audit for OEM.

## **c. Onsite checking of the software**

The auditor appointed by ECC shall check the selection software consistency by selecting two (2) orders at random from the applicant/participant sales records. This check shall be conducted:

- during factory audits for OEM;
- during the facility audit (where the orders to the customers can be accessed) for BN.

If the software consistency check cannot be performed because the technical data sheet on which appear the performances of the sold unit isn't available in the sales record, the auditor shall at least check that the software version appears on the printouts of the software or that the traceability is sufficient between printouts and software, enabling identification of the associated software for any printout of the sales record. If the software is an online software without any software version indicated, the participant/applicant has 12 months to implement it on the software.

Whenever possible, the specific visit for BN shall be scheduled once the OEM has undertaken the testing procedure and/or the OEM on-site checking of software has been performed in order to compare the BN software results to recent OEM software results. Otherwise the software will be checked against the results of campaign N-1.

The applicant/participant's representative shall fully inform the auditor by submitting all relevant assembly drawings, specifications, and technical data sheets of the units under check.

If software consistency check is applicable, the composition, technical specifications and performance from recalculation shall be the same as the one specified and announced to the customer. If one of the performance values obtained by the auditor differs by more than the acceptance criteria, this is considered as a software consistency failure and the applicant/participant shall update his software according to the relevant procedure (see d). If in the meantime the applicant/participant has officially launched a new software version and recalculation is made with this version, deviations should be traceable in the software update record sheet (sheet ITCU-3, see APPENDIX.B.IIIAPPENDIX.B.III).

If it appears that different software had been used, this shall be considered as a non-respect of procedures.

ECC shall transmit to the applicant/participant the result of the on-site check software as a .pdf file.

## **d. Software consistency failure**

In case the software is proved inconsistent during the initial check or the on-site check, the applicant/participant shall update his software according to the Rerating procedure.

### **III.1.4. Evaluation and decision**

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

The certification is granted on condition that:

- If the aforementioned checks prove all the ranges compliance with the requirements specified in Appendix A
- All the other requirements from the present Technical Certification Rules 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.2. Surveillance procedure**

The provisions of the Certification Manual apply.

### **III.2.1. Implementation of surveillance operations**

#### **III.2.1.1. Surveillance audit**

In addition to the provisions laid down in the Certification Manual, the following requirements apply:  
For the surveillance procedure, the surveillance audit follows the same rules than the admission audit.

#### **III.2.1.2. Selection of units to be tested**

In addition to the provisions laid down in the Certification Manual, the following requirements apply:  
For the surveillance procedure, ECC shall select units following the same rules than the admission procedure.

#### **III.2.1.3. Surveillance tests**

In addition to the provisions laid down in the Certification Manual, the following requirements apply:  
For the surveillance procedure, the surveillance tests follow the same rules than the admission tests.

#### **III.2.1.4. Software checking procedure**

In addition to the provisions laid down in the Certification Manual, the following requirements apply:  
For the surveillance procedure, the surveillance software checking procedure follows the same rules than the admission tests.

#### **III.2.1.5. Technical and commercial documentation check**

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

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

Every year, ECC checks whether the certified products still fulfil the requirements:

- For Brand Name (BN) companies, applicable steps of the software checking procedure and audit procedure shall be conducted (see III.1.3.4 and III.1.3.1).
- For Original Equipment Manufacturers (OEM), repetition tests in the independent laboratory, software checking procedure and factory audit shall be conducted annually in compliance with the Certification Schedule (see APPENDIX C).

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

- The previous test campaign (N-1) has been successfully completed.
- The scheduled audits have been performed by the auditor and are 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 then 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**

The provisions of the Certification Manual apply.

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

The provisions of the Certification Manual apply.

#### **III.3.3. Changes concerning the quality organisation of the manufacturing and/or marketing process**

The provisions of the Certification Manual apply.

#### **III.3.4. Additional admission for a new model and/or new range**

The provisions of the Certification Manual apply.

#### **III.3.5. Changes concerning the certified product**

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

The applicant/participant shall inform ECC of any modification of the product portfolio by updating the declaration file (ITCU-1) and sending the updated selection software together with the software update record sheet ITCU-3. Non-compliance of the applicant/participant 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.3.6. 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

### APPENDIX.A.I. Purpose

The purpose of this document is to establish definitions and specifications for testing and rating of IT Cooling Units (ITCU) for the related Programme.

### APPENDIX.A.II. Testing requirements

The following specifications are applicable for qualification tests and repetition tests.

#### A.II.1. Standard Rating Conditions

4 application classes of temperature are considered:

Table 11 Classes of Standard Rating Conditions

Class	Indoor Air Entering Dry Bulb Temperature	Indoor Air Entering Relative Humidity*
Class 1	24 °C	50%
Class 2	30 °C	35%
Class 3	35 °C	27%
Class 4	40 °C	20%
Class 5		

\*: Classes are defined with a Relative Humidity corresponding to a 9.3 g/kg absolute humidity

Participant/Applicant must declare the performances of their units under the mandatory standard rating conditions Class 2. As an option, in addition to class 2 they can declare their units under Class 1, 3 and/or 4.

The tests will be realized with the following testing **conditions**:

Table 12 Standard Rating Conditions

Technology type	Indoor Rating Temperatures	Outdoor Rating Temperatures
CRAC-A split unit	Mandatory test point: CLASS 2  Optional point: CLASS 1, 3, 4, and 5	<u>Air Entering Temperature:</u> 35°C Dry Bulb 24°C Wet Bulb  <u>If only the internal part is considered in the test (no condenser), units shall be tested with a fixed condensing temperature:</u> 45°C fixed condensing temperature
CRAC-W Unit	Mandatory test point: CLASS 2  Optional point: CLASS 1, 3, 4, and 5	<u>Water Temperature (in/out):</u> 30°C/35°C
CRAH unit	Mandatory test point: CLASS 2  Optional point: CLASS 1, 3, 4, and 5	<u>Chilled Water Temperature (in/out):</u> Conditions below in Table 13

Hybrid CRAH/CRAC-A unit	Mandatory test point: CLASS 2  Optional point: CLASS 1, 3, 4, and 5	CRAH part	<u>Chilled Water Temperature (in/out):</u> Conditions below in Table 13
		CRAC-A part	<u>Air Entering Temperature:</u> 35°C Dry Bulb 24°C Wet Bulb  <u>If only the internal part is considered in the test (no condenser), units shall be tested with a fixed condensing temperature:</u> 45°C fixed condensing temperature
Hybrid CRAH /CRAC- W unit	Mandatory test point: CLASS 2  Optional point: CLASS 1, 3, 4, and 5	CRAH part	<u>Chilled Water Temperature (in/out):</u> Conditions below in Table 13
		CRAC-W part	<u>Water Temperature (in/out):</u> 30°C/35°C

For CRAH units, the chilled water temperatures (in/out) are the following:

**Table 13 Standard Rating Conditions for CRAH units**

Class	Mandatory point (In/Out) temperature	Optional point (In/Out) temperature
Class 1 - Optional	10°C/16°C	-
Class 2 – Mandatory	10°C/16°C	15°C/21°C
Class 3 - Optional	15°C/21°C	10°C/16°C and/or 18°C/26°C
Class 4 - Optional	18°C/26°C	15°C/21°C and/or 20°C/30°C
Class 5 - Optional	20°C/30°C	18°C/26°C

### A.II.2. Non-Standard Rating Conditions

The range of non-standard operating conditions corresponds to all the other conditions allowed by the manufacturer's software, i.e. those selectable in the software.

For the CRAH units, when selected these non-standard conditions must respect the following rules:

- Minimum water entering temperature of 5°C
- Water temperature difference (in/out) *can be* 5-12 °C (*inversely proportional to the nominal water flow of the device*)

### A.II.3. SASO conditions

For units declared for SASO option, the following conditions apply:

**Table 14 SASO conditions**

Type of unit	Class	Outdoor Air Temperature	Indoor Return Air Dry Bulb Temperature	Indoor Return Air Dew Point Temperature
Air-cooled units	Class 1	35°C	23,9 °C	11,1°C
	Class 2		29,4 °C	11,1°C
	Class 3		35 °C	11,1°C

**Table 15 SASO fluid conditions**

Type of unit	Entering water temperature	Leaving water temperature
Water cooled units (CRAC-W)	28,3°C	35°C
Chilled water units (CRAH)	10°C	16,7°C

## APPENDIX.A.III. Particular testing specifications

### A.III.1. Overview of the different set-ups

The following technical drawings give informative overviews of how the different technologies will be installed and tested in the independent laboratory in accordance with the defined applicable standards.

On the technical drawings, the following abbreviation are used:

Abbreviation	Signification
$t_a$	Air entering temperature
$p_n$	Air entering pressure
$tw_1$	Water entering temperature
$pw_1$	Water entering pressure
$tw_2$	Water exiting temperature
$pw_2$	Water exiting pressure
$ta_2$	Air exiting temperature
$p_2$	Air exiting pressure
$q_{wm}$	Water conditioning flow

Downflow unit set-ups:

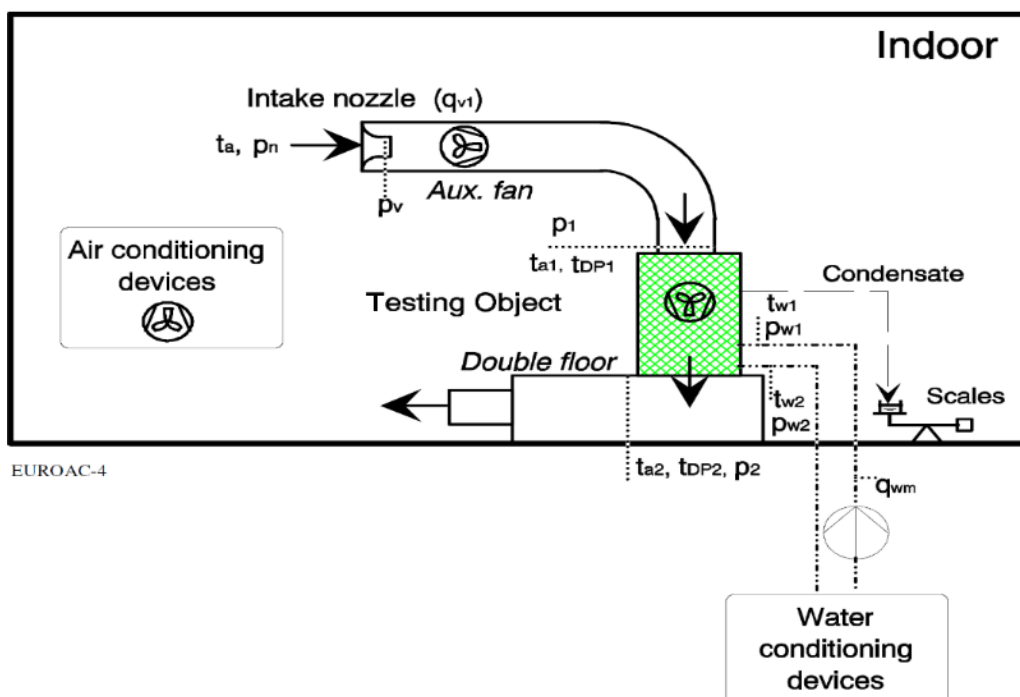


Figure 2 Down-flow one room set-up

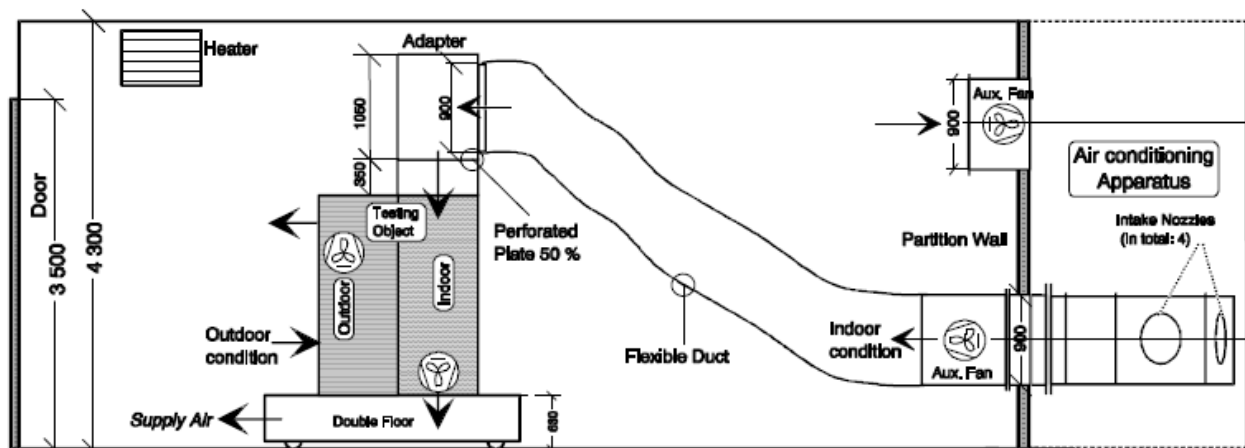
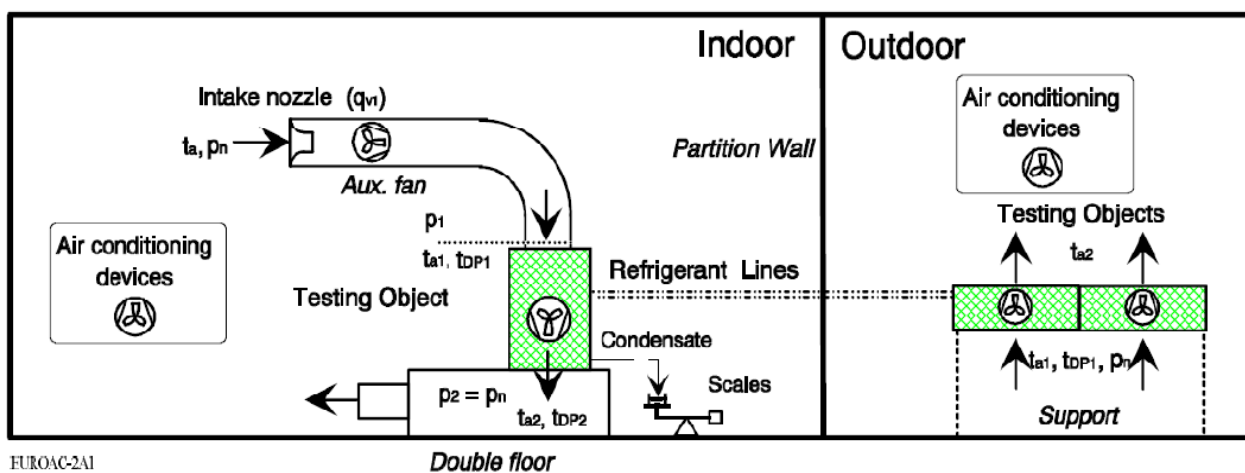


Figure 2 Down-flow two room set-up

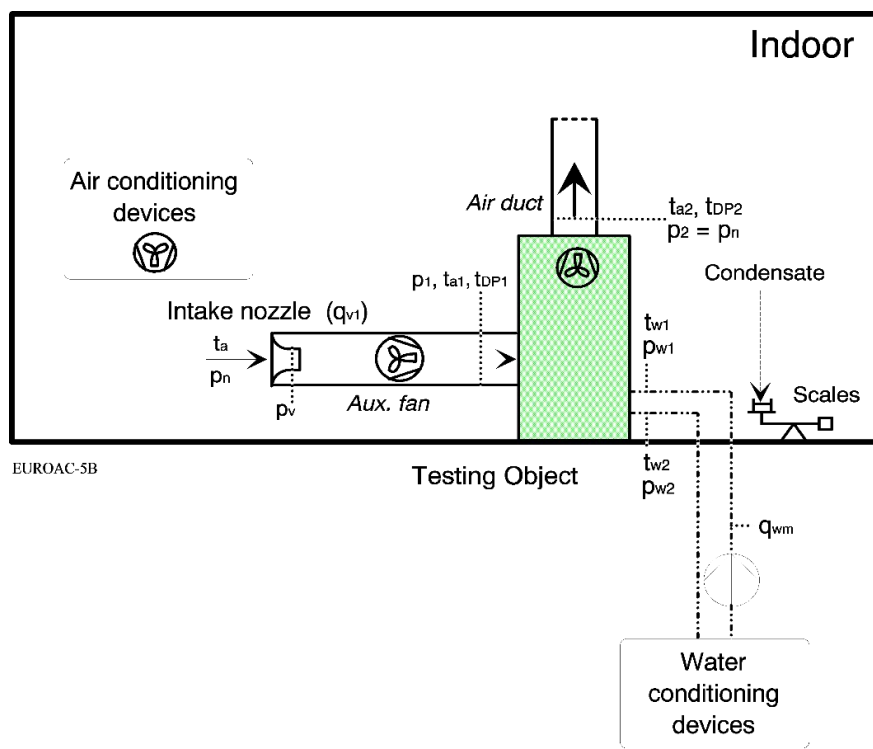


EUROAC-2A1

Double floor

### Uplow unit set-ups:

Figure 3 Down-flow split unit set-up



EUROAC-5B

Figure 4 Up-flow one room unit set-up

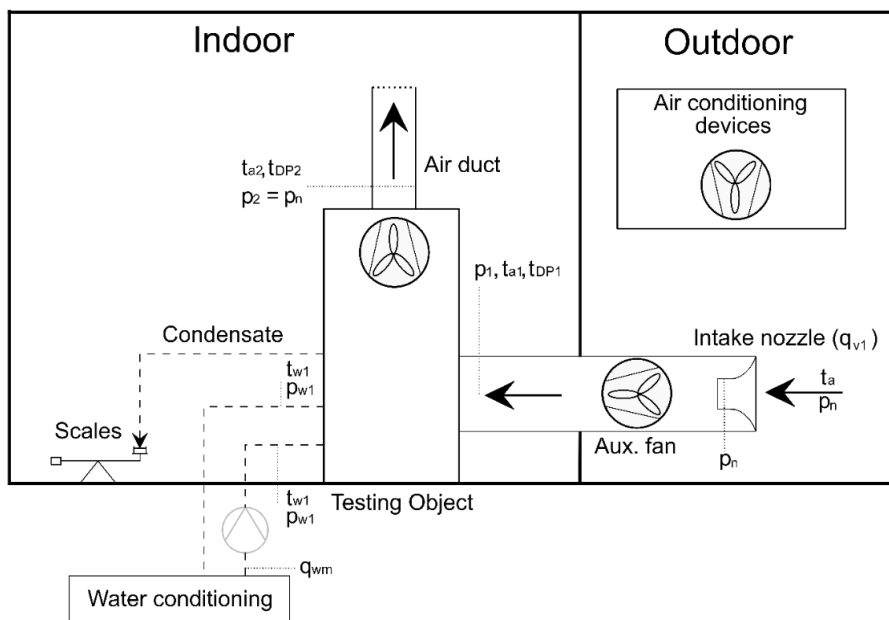


Figure 5 Up-flow two room unit set-up

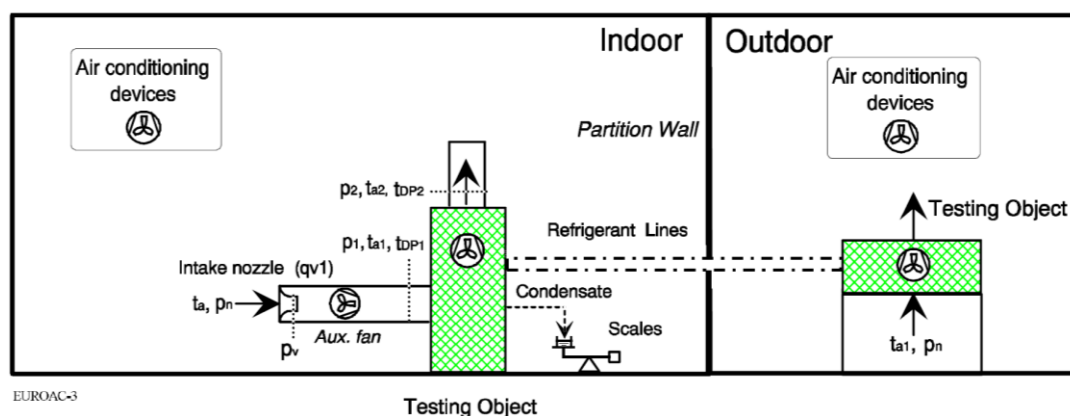


Figure 5 Up-flow split unit set-up

For CRAC/A unit tests, it is important for the assigned laboratory to record the subcooling and superheating values if requested by the Participant in the TDS document. The Participant shall be aware of that this request increases the risk of the refrigerant leakage and requires ad hoc service ports otherwise the measurements could provide wrong output.

For CRAC and CRAH unit tests, the condensate rate coming from the unit drainage port shall be measured. When more than one drainage port, the manufacturer shall provide fittings to accommodate all drainage into one single port. If applicable, the amount of water provided to the test room, where the return air side of the unit is placed, by the humidifiers, as a double checkpoint.

### A.III.2. Heat medium and heat exchange refrigerant

The CRAH units shall be tested with water as heat medium.

The CRAC units shall be tested with the refrigerant with which they have been designed.

### A.III.3. External Static Pressure (ESP)

Filters, filter plenum, and other equipment recommended as part of the unit shall be in place. The minimal ESP specified below shall be used. Units in declaration file shall be declared with the same ESP values. ESP measurement protocols followed by the laboratory shall be the same for every unit tested.

Laboratory shall indicate in the test report:

- ESP Measurement Method
- Photo of the installed unit, especially photo with ducts and floating floor when applicable
- Drawings of the installation with positions of sensors, especially position of pressure sensors and temperature sensors

**Table 16 ESP levels**

Capacity (kW)	Minimal External Static Pressure (Pa)	
	Down-flow discharge into double floor	Up-flow discharge into duct all units
< 30	30	-
≥ 30	50	-
All	-	30

During the test, if the above ESP levels cannot be reached because the installation configuration (floating-floor, ducts...) generates too much pressure loss, the laboratory shall use the declared air flow rate limiting the ESP to a minimum value of 0 Pa and ECC will perform a recalculation of the performances of the unit with the OEM's software by implementing as an input the measured ESP during the test.

The results of the test will then be compared to the performances of the new printout of the unit.

#### **A.III.4. Voltage and frequency**

Rating tests shall be performed at the rated voltage listed on the unit's nameplate. For units with dual voltage ratings listed on the nameplate, the standard rating test shall be performed at the lower of the two voltages.

Rating test shall be performed at the 50Hz frequency. As an option, the 60Hz frequency can be declared as well. For units declared for the SASO option, the test voltage shall be 400V and the tested frequency shall be 60 Hz.

##### **A.III.4.1. Other specifications**

- For double CRAH units, if the 2 coils have the same cooling capacity then only one coil will be tested by the laboratory, if not the two are tested. If there is a failure on the unit with 2 same coils, then the failures apply to both coils.
- For Hybrid units and double CRAH units, each part (CRAH or CRAC) are tested separately, i.e. one part is turned off when the other part is tested.
- For the capacity measurement, the capacity will be measured on the water side.
- CRAC\_A\_S units will be tested without the external part (condenser), if not declared for the SASO option. The units will be tested with a fixed condensing temperature. All data shall be declared at the 45°C condensing temperature on the declaration list.

Therefore, the possibilities of selection are the following:

Units that can be selected and tested	Conditions of tests	
Standard units	Standard conditions	According to declaration list at a fixed condensing temperature of 45°C
Standard units selected with software	Non-standard conditions	<ul style="list-style-type: none"> <li>• Different indoor air temperature</li> <li>• Different fixed condensing temperature</li> </ul>

## APPENDIX.A.IV. Rating requirements

### A.IV.1. Test check

ECC shall conduct a “test-check”, i.e. the performances will be recalculated at the test operating conditions using the selection software.

A performance item fails when the difference between the recalculated value and the test results differs by more than the allowable acceptance criterions (see 0).

A test fails when one or more performance items fail.

### Certified Performance Items

The following performance characteristics declared by the applicant/participant shall be verified by tests:

Table 17: Certified Performances

N°	Certified performance	Unit	Symbol	Standard
1	Net total cooling capacity	kW	$P_C$	EN 14511:2022 (4 parts) for CRAC units. EN 1397, 2015 for CRAH units
2	Net sensible cooling capacity	kW	$P_S$	EN 14511:2022 (4 parts) for CRAC units. EN 1397, 2015 for CRAH units
3	Power input	kW	$P_E$	EN 14511:2022 (4 parts) for CRAC units. EN 1397:2021 for CRAH units
4	A-weighted sound power indoor side	dB(A)	$L_{W-in}$	EN 12102-1:2022 for CRAC units. EN 16583:2022 for CRAH units.
5	A-weighted sound power radiated by duct	dB(A)	$L_{W-du}$	EN 12102-1:2022 for CRAC units. EN 16583:2022 for CRAH units.
6	A-weighted sound power outdoor side	dB(A)	$L_{W-out}$	EN 12102-1:2022 for CRAC units.
7	Water pressure drop	kPa	$D_{pc}$	EN 1397:2021 for CRAH units.
8	Unit or supply air flow rate	m <sup>3</sup> /h	$Q_v$	EN 14511:2022 (4 parts) for CRAC units. EN 1397:2021 for CRAH units.
9	Net EER - Energy efficiency ratio	W/W	EER	Calculation
10	Net SHR - Sensible heat ratio	W/W	nSHR	Calculation

For the SASO option, the certified performances are as follow:

N°	Certified performance	Unit	Standard
1	Total Cooling Capacity	Btu/h or kW	SASO 2874
2	Net Sensible Cooling Capacity	Btu/h or kW	SASO 2874
3	Rated Net Sensible coefficient of performance (NsensCOP)	kW/kW	SASO 2874 by calculation
4	Power input	kW	SASO 2874

## APPENDIX.A.V. Acceptance criteria

When tested in the laboratory the obtained performance data shall not differ from the claimed values by more than the following acceptance criterion values:

**Table 18 Acceptance criteria, mean and high deviation thresholds for standard conditions**

		Performances	Acceptance criteria	Mean Deviation threshold	High Deviation threshold
Thermal performances	Standard Rating condition	Net total cooling capacity	< -5%	< -15%	< -20%
		Net sensible cooling capacity			
		Power input			
		Water pressure drop	>+15%		
		Unit air flow	+/- 10%		
		Energy Efficiency Ratio	< -8%	< -12%	< -17%
		NsCOP	< -5%		
		Sensible Heat ratio	< -8%		
Acoustic performance		A-weighted sound power level	>+ 2 dB(A)		

If any of individual points of measurement shows a deviation larger than the acceptable criterion, the failure shall be declared and the failure procedure applied.

**Mean Failure:** When tested, if the performances obtained differ from the values claimed by the Manufacturer by more than the mean deviation threshold, the failure shall be included in the MVF calculation (see III.1.3.3.e)

**High Failure:** When tested, if the performances obtained differ from the values claimed by the Manufacturer by more than the high deviation threshold, the high failure treatment shall be applied (see III.1.3.3.e).

All acceptance criteria are defined in relative deviation, except the sound power levels which are defined in absolute deviation.

When selected as per A.II.2, the following rules apply to determine the acceptance criterion for the thermal performance tests at non-standard conditions. For such tests, there is a minimum limit of 50% on fan and compressor modulation.

**Table 19 Acceptance criterion for the thermal performances at non-standard condition (Restricted map)**

	Rules	Acceptance criterion
Thermal performances	<p>Any air temperature +/- 3°C than the standard rating conditions.</p> <p>Any water inlet temperature +/- 2 °C than the standard rating conditions above 20 °C.</p> <p>Any water inlet temperature +/- 3 °C than the standard rating conditions below/equal 20 °C.</p> <p>dT between the water inlet and outlet is fixed at 5 °C.</p> <p>Condensing temperature is fixed at 45 °C.</p> <p><i>Any water flow rate in the heat exchanger of the CRAH unit is greater than 25% of the water flow rate causing laminar flow in the same heat exchanger</i></p>	Same as given in Table 18.



Any condition selected outside of the restricted map for a unit, regardless its type, the acceptance criterion will be doubled. Non-standard condition tests do not cause any mean or high failures, thus, any penalties as well. Any failure will require a rerate on the tested unit only.

## APPENDIX B. FORMS

### APPENDIX.B.I. Form ITCU-1 : Declaration file

The form ITCU-1 (declaration file) to be filled in shall be sent by ECC to:

- applicants who have signed the license agreement,
- participants on an annual basis before the deadline specified in the Certification schedule.

A template will be available for information and upon request.

### APPENDIX.B.II. Form ITCU-2 : Technical datasheet (TDS)

The form ITCU-2 (Technical Data Sheet) to be filled in shall be sent by ECC to applicants/participants who have returned the form ITCU-1 duly completed.

A template will be available for information and upon request.

### APPENDIX.B.III. Form ITCU-3 : Software update record sheet

The form ITCU-3 (Software update record sheet) shall be submitted by the Participant to inform ECC for the new software version certification. In case the ECC certified performances are affected with any of the modifications, the declarations shall be updated and submitted before the release of the new software.

A template will be available for information and upon request.

Eurovent Certita		ITCU PROGRAMME SELECTION SOFTWARE RECORD SHEET FOR VERSION UPDATES (SAMPLE PAGE)		EUROVENT CERTIFIED PERFORMANCE	
<p><b>!</b> If any of the modifications within the version update requires an update of the previous product declaration file (ECP certified performance changes/corrections, new model/range addition, or removal, new option addition which requires a new BMG, etc.), it shall be updated and submitted before the new software version release. Some modification examples are available in the table below.</p>					
New version	Release date	Brief description of the modifications affecting the ECP Certified Performances and Characteristics, or General Software Requirements	Causes the latest declaration file to be updated		
	Click here to enter a date.		<input type="checkbox"/>		
		Editorial (no need to provide details if related to the price change, or not related to the software requirements, etc.)	<input type="checkbox"/>		
		Seasonal efficiencies and pressure differences added to the printout	<input type="checkbox"/>		
		dT is allowed to be entered by the user	<input type="checkbox"/>		
		XXX model/range added/removed	<input checked="" type="checkbox"/>		
		Screw compressor added for certified YYY model/range	<input checked="" type="checkbox"/>		
		Compressor/model change for XYZ model/range	<input checked="" type="checkbox"/>		
		Operating envelope changed for XYZ model/range	<input type="checkbox"/>		
		High pressure pump added for ZZZ model/range*	<input type="checkbox"/>		
		Ultra quiete option of the same XYZ model/range added*	<input checked="" type="checkbox"/>		
<p>* If the concerned models are not declared with the given option but certified through the software, no need to make a declaration update. For such cases, please do not check the box. If else, declaration list shall be updated for such modifications too, and the box shall be checked. See Page 17 (Reporting of the Models) of <a href="#">TCR</a>.</p>					
Prepared by:					
Date: Click here to enter a date.					
ECC	ITCU – Software Record Sheet	Date	23/11/2022		
Version	4.0	Page	1/3		
Eurovent Certita Certification – 48-50 rue de la Victoire – 75009 Paris / FRANCE					

### APPENDIX.B.IV. Form ITCU-4 : Test report result sheet

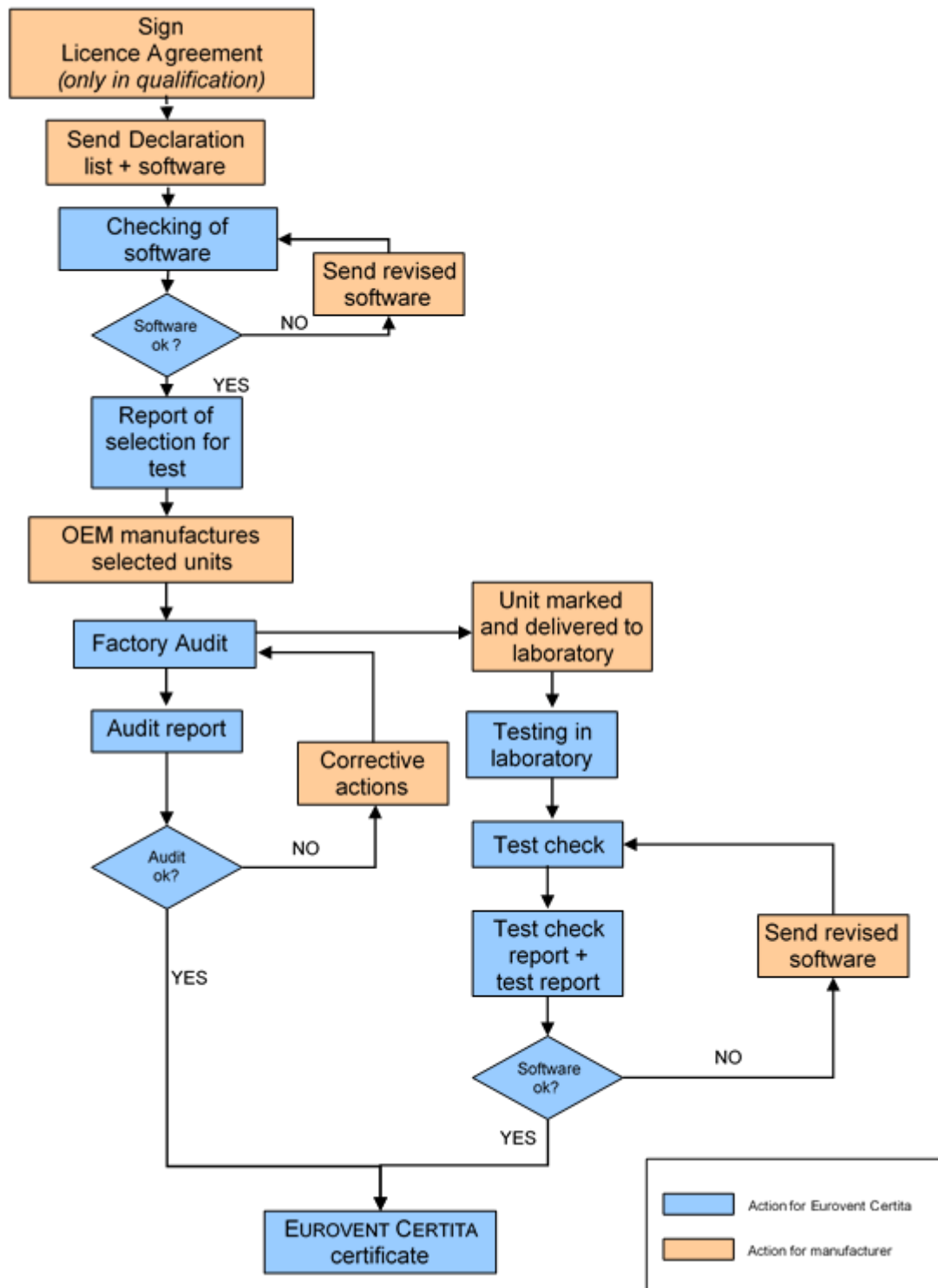
The form ITCU-4 (Test report result sheet) shall be sent by ECC to applicants/participants together with the test report.

A template will be available for information and upon request.

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## APPENDIX C. CERTIFICATION PROCESS AND CAMPAIGN SCHEDULE

### APPENDIX.C.I. Certification procedures: qualification



## APPENDIX.C.II. Repetition procedure schedule

Certification step	Campaign year n
ECC asks for update of product list and software from the participant.	15/11/n-1
The participant sends the up-dated products declaration list and software.	15/12/n-1
ECC send sends the preselection.	31/12/n-1
ECC audits the software compliance to requirements, and some random declaration checks including the previous campaign test results. When the software does not meet the certification requirements the manufacturer has to correct it and send a new version.	15/01/n
The participant confirms selections and ECC send the official selection.	15/01/n
Product delivery + TDS + payment are completed by the participant.	31/06/n
The laboratories carry out all first tests.	30/09/n
ECC performs the on-site audit*.	30/09/n
In case of any non-conformity noticed during an audit, the participant shall submit the corrective action plan.	Within one month after the audit
The auditor evaluates the plan within the following one month.	Within one month after the submittal of corrective action plan
ECC performs a “test-check” to verify that the software is in accordance with the passed test results and forwards the test reports together with the “test-check” results to the participant.	15/10/n
The participant can ask for second tests before.	Within one month from reception of the test results
Product delivery + TDS + payment are completed by the participant for second tests.	Within one month after the request for a second test
Rerated software is sent to ECC (when applicable).	Within one month following the rerated results accepted by the Participant
Eurovent Certita Certification performs a “test-check” to verify that the software is consistent with the rerated test results (when applicable).	Within two weeks following the rerated software shared
The laboratories carry out all second tests.	30/11/n
Eurovent Certita Certification performs a “test-check” to verify that the software is in accordance with the passed test results of the second test, and forwards the test reports together with the “test-recheck” results to the participant.	15/12/n
Rerated software is sent to Eurovent Certita Certification (when applicable).	Within one month following the rerated results accepted by the Participant
Eurovent Certita Certification performs a “test-check” to verify that the software is consistent with the rerated test results of the second test (when applicable).	Within two weeks following the rerated software shared
Diploma for test campaign N are valid until	30/09/n+1

## APPENDIX D. TESTING IN PARTICIPANT LABORATORY

### APPENDIX.D.I. Introduction

Only the tests which are out of capability of independent test laboratories, and the tests of SASO option can be performed in the Participant Laboratory when the laboratory is approved by the ECC. Participants can take the Participant Laboratory option for the unit testing. It is not the intent of this programme to preclude certification if a Participant does not have a qualified test facility. Test facilities of Participants approved by ECC will therefore be available to a Participant not having a test facility.

Tests in Participant Laboratories shall be performed under supervision and control of an independent laboratory (test agency) approved and under contract with ECC. Independent laboratories, who have dedicated personnel for this purpose, are shared below.

- IMQ S.p.A., Amaro (Italy)

The test agency is requested to install its own instruments (apart from the calibrated nozzles of participant laboratories for the tests of ducted air-cooled units) and to carry out the complete test under its own responsibility. The Participant's personnel are requested to help during the preparation and to operate the test installation during the measurement. The Participant may perform its own measurement in parallel, but only results obtained by the independent laboratory are considered by ECC.

ECC can validate the Participant's laboratory based on the tests done during the Participant Laboratory tests. The rules regarding the official validation of the Participant Laboratory are given in Appendix F.

#### **Temporary approval document (Approval of Compliance):**

If the Participant Laboratory is already recognized by ECC, ECC will give an Approval of Compliance document, valid for a certain period defined in this Technical Certification Rules, and which mentions:

The limit of the laboratory in the document is determined with the maximum capacity tested at standard rating conditions separately for each product type.

### APPENDIX.D.II. Basic outline of the procedure

The following procedure shall be applied by assigned responsible for each step. In addition to the given basic outline below, test methods, standard/seasonal performance ratings shall be in accordance respectively with the standards defined in section A.IV.1.

- Application for "Approval of Compliance" to ECC by Participant Laboratory
- Approval of Participant Laboratory by the independent laboratory selected by ECC (based on characteristics of test installation)
- Selection of the unit to be tested and the test conditions by ECC
- Selection of the independent laboratory by ECC
- Direct contact to be established between Participant Laboratory and independent laboratory by Participant Laboratory for scheduling
- Test date to be agreed between Participant and independent laboratory according to the campaign schedule
- Participant to provide the selected independent laboratory with all the required information concerning test installation
- The independent laboratory to provide detailed request for the following preparations to be executed by Participant Laboratory about the instruments and measuring locations
- Installation of the unit to be made by Participant Laboratory according to the test schedule
- Start-up of the unit in Participant Laboratory
- Unit to be tested to ensure that the readiness of Participant Laboratory in terms of installation and measurements by Participant Laboratory
- Participant Laboratory to get prepared for the selected testing conditions

- On the agreed date of test, independent laboratory installs its own instruments
- Tests are conducted as required in accordance with the related standards

In addition to the above shared points, Participant Laboratory is responsible to get prepared for the test conditions selected by ECC and is also responsible to know test methods and procedures and to calculate required corrections defined in the standards defined in section A.IV.1.

## APPENDIX.D.III. Detailed procedure

### D.III.1. Approval of independent test agencies/laboratories

The independent test agency shall have qualified personnel and adequate instruments in order to meet the requirements concerning maximum acceptable uncertainty of measurement as specified in the standards defined in section A.IV.1.

### D.III.2. Approval of Participant Laboratory (Approval of Compliance)

The Participant shall send an official request to the ECC with the essential characteristics of their testing laboratory. The test installation shall be able to satisfy the requirement of the standards defined in section A.IV.1 including the maximum permissible deviations.

The independent laboratory selected by ECC shall approve the capability of Participant Laboratory based on the characteristics of the test installation. Upon this approval, Participant Laboratory is qualified with the 'Approval of Compliance' document by ECC. For each Participant, this approval is annual and based on the double measurement results. The surveillance tests shall be conducted in compliance with the Certification Schedule.

If the Participant wants to increase the limit in the approval of compliance, a test shall be done with a unit which can reach the proposed limit.

- End of validity of the approval of compliance: **the same validity date with the certificate**

#### Annual Renewal of 'Approval of Compliance'

There shall be at least one test conducted in Participant Laboratory within last two campaigns to extend the validity date of the Approval of Compliance document for one year. The highest capacity is determined by checking all tested capacities ever at the concerned Participant Laboratory.

**Regarding the communication of this approval of compliance, as it is not a certification**, it cannot be promoted as a certification or accreditation, however, the document can be presented in front of the participant laboratory or on a website etc. The ECP mark shall not be applied and used for the laboratory itself.

The test installation shall be designed in such a way that requirement from test agencies concerning installation of measuring probes and instruments could be satisfied. That concerns in particular the installation of a water flow meter for which the diameter and length of the connecting pipe are specified. In order to obtain a homogeneous water temperature, a mixing device shall be used on the leaving water.

For the airflow measurement on the ducted units (indoor and/or outdoor), if a calibration certificate, established by an accredited laboratory, of the complete measurement chain of the Participant is provided to ECC:

- this certificate shall include the following elements in order to be accepted:
  - for each checking point: Participant's airflow measurement, test agency's airflow measurement, relative deviation, temperature, relative humidity, pressure drop across **the nozzles** measured by the Participant.

- for all checking points the relative deviation between the airflow rate measured by the Participant and the airflow rate measured by the test agency shall not exceed 5% **after correction by calibration coefficients** which is the maximum uncertainty of measurements defined in EN 14511-3:2022.

In case the test agency determines that the Participant laboratory does not fulfil the required specifications, the test shall not be carried out. The Participant shall then send his unit to the independent laboratory for testing.

### **D.III.3. Organisation of test**

When the unit to be tested and the test agency have been selected by ECC, the direct contact between test agency and the Participant shall be established. The test agency and Participant shall agree on the date of test. The test agency personnel shall inspect the test installation and connect measuring devices. The test is then performed under full responsibility of the test agency.

This preparation shall be carried out before the day of the test.

ECC shall receive the test report prepared by the test agency.



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