



TECHNICAL CERTIFICATION RULES OF THE EUROVENT CERTIFIED PERFORMANCE MARK



AIR FILTERS

Identification: [ECP 11 FIL](#)

Revision 3 – [January 2024](#)

(This version cancels and replaces any previous versions)

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The purpose of these Technical Certification Rules is to prescribe procedures for the operation of the Eurovent Certified Performance (ECP) certification programme for Air Filters (FIL), in accordance with the Certification Manual.

Modifications as against last version:

No.	Modifications	Section	Page
1	<i>Clarification of the certified performance for Initial Pressure Drop</i>	<i>I.2</i>	<i>5</i>
2	<i>Modification of the testing standard version</i>	<i>II.1.1</i>	<i>8</i>
3	<i>Clarification of the scope for ISO 9001 Certificate for Brandname</i>	<i>II.1.2</i>	<i>8</i>
4	<i>Modification of acceptance criteria</i>	<i>II.2.1</i>	<i>8</i>
5	<i>Modification of table 2 acc. to ISO 15805:2021</i>	<i>I.1.1.1b</i>	<i>11</i>
6	<i>Declaration of main and local website at the beginning of the certification campaign (admission and surveillance).</i>	<i>III.1.1</i>	<i>14</i>
7	<i>Clarification of the treatment of Internal Test Report</i>	<i>III.1.1</i>	<i>14</i>
8	<i>Addition and Publication of the test of the Initial Pressure Drop at 0.944 m³/s airflow</i>	<i>III.1.3.3b</i>	<i>18</i>
		<i>III.1.4</i>	<i>21</i>
		<i>III.1.4.3</i>	<i>23</i>
		<i>III.5</i>	<i>27</i>
9	<i>Modification of the Mean Value of Failure (MVF) rules for the 1st surveillance year</i>	<i>B.II</i>	<i>30</i>

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TABLE OF CONTENTS

I. GENERAL INFORMATION	5
I.1. Scope	5
I.2. Certified performances	5
I.3. Definitions	6
I.4. Contributors	6
II. REQUIREMENTS OF THE REFERENCE DOCUMENT	8
II.1. Reference documents	8
II.2. Specific requirements and quality management	8
II.3. Marking	10
III. CERTIFICATION PROCESS	14
III.1. Admission procedure	14
III.1.1. Declaration file	14
III.1.2. Admissibility of the application	16
III.1.3. Implementation of checking operations	16
III.2. Surveillance procedure	24
III.2.1. Implementation of surveillance operations	24
III.2.1.1 Surveillance sampling	24
III.2.1.2 Selection of filters to be tested	24
III.2.1.3 Surveillance tests	24
III.2.1.4 software checking procedure	25
III.2.1.5 Desk study	25
III.2.1.6 Technical and commercial documentation check	25
III.2.1.7 Challenge procedure	25
III.2.2. Evaluation and decision	25
III.2.2.3 Repeated failures along the test campaigns	26
III.3. Declaration of modifications	26
III.3.1. Changes concerning the participant	26
III.3.2. Changes concerning production sites	26
III.3.3. Changes concerning the quality organisation of the manufacturing and/or marketing process	26
III.3.4. Changes concerning the declaration list (model and/or range)	26
III.3.5. Changes concerning the certified product	27
III.3.6. Temporary or permanent cessation of production of a certified product	27
III.4. Suspension/cessation conditions	27
APPENDIX A. CAMPAIGN SCHEDULE	29
APPENDIX B. CALCULATION METHOD AND IMPLEMENTATION OF MEAN VALUE OF FAILURE (MVF)	30
B.I. General	30

B.II. Newcomers and admission procedure.....	30
APPENDIX C. TEST RESULTS INTERPRETATION	31
C.I. All performances are within the tolerances	31
C.II. Some performances are out the tolerances	31
C.III. All performances are within the tolerances, however, the filter ISO class is different from the declaration.....	31
C.IV. All performances are within the tolerances, however, the ePMx group measured is better than in the declaration	32

I. GENERAL INFORMATION

I.1. Scope

I.1.1. General

The purpose of these Technical Certification Rules (TCR) is to prescribe procedures for the Eurovent Certified Performance Programme for Air Filters.

Participation in this programme is open to:

- Original Equipment Manufacturers (OEM)
- Brand Name company (BN) selling products already certified by OEM

Random tests are conducted under this programme. These tests shall be conducted at the independent test facilities approved by Eurovent Certita Certification (ECC) and in accordance with this relevant Technical Certification Rules standard.

The programme scope covers Air Filter elements rated and sold as ISO ePM₁, ISO ePM_{2.5} and ISO ePM₁₀ according to EN ISO 16890-1:2016, referring to a front frame size of 592x592mm according to standard EN 15805:2021 and with a nominal airflow between 0.24 and 1.5 m³/s (including filter mats). When a company joins the program, all relevant ISO ePM₁, ISO ePM_{2.5} and ISO ePM₁₀ air filter elements shall be declared.

As manufacturers may produce a large number of filters with different length/depth there is an acceptance criteria for the declaration of filters belonging to the same filter family as already certified filters with the same nominal airflow and with different length/depth of the overall filter element within an acceptance criteria of +/- 10% or 50 mm (whatever is the smaller). Outside of this acceptance criteria the filters shall be declared.

The following filters are specifically excluded from the scope:

- ISO Coarse filters
- All combination filters with active carbon

I.1.2. Certify-all principle

Whenever a company participates in the programme for FIL, all filters that are promoted by the applicant/participant to end-users, specifiers, trading companies, contractors by means of paper or electronic catalogue, price list or software within the scope of the programme, shall be certified, in accordance with these Technical Certification Rules. This includes all models in modular ranges. For the FIL programme, the certify-all requirement as defined in the Certification Manual is applicable to the European market and the Turkish market (since 1st January 2019).

I.2. Certified performances

Certified performance items:

- Initial pressure drop Δp_0 in Pa, measured according to EN ISO 16890:
 - *at 50%, 100%, 75% and 125% of the nominal airflow*
 - *at 0.944 m³/s airflow (for filters from Energy Efficiency Class A+ to D only)*
- ePM₁, ePM_{1,min}, ePM_{2.5}, ePM_{2.5,min} and ePM₁₀ efficiencies measured according to EN ISO 16890
- Eurovent Energy Efficiency Class according to Appendix A is calculated from the annual energy consumption
- Annual Energy Consumption

I.3. Definitions

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

Air Filter Element: A filter unit to clean air from particulate contamination comprising filter material including framing, supporting parts and gaskets, the total to be inserted into a filter housing device.

Performance Data: Single values out of the filter test report as carried out in accordance with EN ISO16890:2016.

Filter family: A filter family is characterised by the following:

- The same filter material
- The same basic construction (e.g. bag, V-type, etc.)
 - the same face velocity: rated air-flow / min. net filter area; (does not have to be published).
 - The airflow rate shall be adapted to the face area with an acceptance criteria of +/- 10%.
 - The same length/depth of the overall filter element with an acceptance criteria of +/- 10% or 50 mm whatever is the smaller
 - For Bag and V-Type filters, the same ratio of filter medium area to front face area with an acceptance criteria of +/- 10%.
 - Same initial pressure drop with an acceptance criteria of +/- 10%.
- The same ePM_x group
- The same ISO efficiency rating
- Published data available about: basic construction, filter media, filter class available via internet or other published sales brochures.

Representative Filter Element: Any type chosen by Eurovent Certita Certification out of a “filter” fitting into the EN ISO16890:2016 – test rig.

Particulate matter efficiency ePM_x: efficiency of an air cleaning device to reduce the mass concentration of particles with an optical diameter between 0,3 µm and x µm.

ePM_x group designation: designation of a group of filters fulfilling certain requirements in the filter classification (ISO ePM₁, ISO ePM_{2.5}, ISO ePM₁₀ and ISO Coarse)

Filter depth: overall depth of the filter including the frame (complete filter). The Filter Depth defined here (and declared in the declaration file) is not the one used to calculate the filtering area.

Initial Pressure Drop: Pressure drop of the clean filter operating at the test air flow rate.

Minimum Efficiency: fractional efficiency after applying the conditioning method defined in EN ISO 16890-4:2016

Eurovent Energy Efficiency Class: Energy Efficiency class as defined in – Appendix A.

Annual Energy Consumption: Estimated Electricity Consumption per year due to an air filter as defined in Eurovent Document 4/21 - 2019 (Eq. (1a), kWh/annum).

ISO efficiency rating: Filter class according to EN ISO 16890 (e.g. ISO ePM₁ 65%)

I.4. Contributors

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

I.4.1. Audit body

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

EUROVENT CERTITA CERTIFICATION SAS
48/50 rue de la Victoire
F- 75009 PARIS
Tel : + 33 1 75 44 71 71
www.eurovent-certification.com

I.4.2. Independent laboratory / test body

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

CETIAT

*Domaine Scientifique de la Doua
54 avenue Niels Bohr
69100 VILLEURBANNE
FRANCE
Website: www.cetiat.fr*

Eurofins Expert Services Ltd

*Tekniikantie 15 A, Research Hall 1
FI 02150 ESPOO
FINLAND
Website: <http://www.eurofins.fi/expertservices>*

RISE Research Institutes of Sweden

*Division: Samhällsbyggnad / built environment
Industrigatan 4
SE-50462 Borås Sweden
Website: www.ri.se*

II. REQUIREMENTS OF THE REFERENCE DOCUMENT

II.1. Reference documents

II.1.1. Product and test standards

The applicable standards are as follow:

- European Standard EN ISO 16890-1:2016: “Air filters for general ventilation - Part 1: Technical specifications, requirements and classification system based upon particulate matter efficiency (ePM)”
- European Standard EN ISO 16890-2:2022: “Air filters for general ventilation - Part 2: Measurement of fractional efficiency and air flow resistance”
- European Standard EN ISO 16890-3:2016: “Air filters for general ventilation - Part 3: Determination of the gravimetric efficiency and the air flow resistance versus the mass of test dust captured”
- European Standard EN ISO 16890-4:2022: “Air filters for general ventilation - Part 4: Conditioning method to determine the minimum fractional test efficiency”
- Eurovent Document 4/21 - 2019: “Energy Efficiency Evaluation of air filters for general ventilation purposes”

II.1.2. Quality management systems standards

The company shall be certified for having a quality management system according to *ISO 9001:2015*.

All manufacturing places for the products within the scope of the certification programme shall be declared to Eurovent Certita Certification (ECC) and shall be covered by an ISO 9001 certificate:

- issued by a certification body accredited by an accreditation body member of the European co-operation for Accreditation (EA, see list in <http://www.european-accreditation.org>)
- whose scope covers at least “production” of all products within the scope of the certification programme
- valid:
 - on the day of the first selection by Eurovent Certita Certification for admission test campaign
 - on the 30th of November year n-1 for surveillance test campaigns (see Appendix A Certification schedule)

A manufacturing place is the address of the factory where the finished product is assembled.

For brand name manufacturer, an ISO 9001 certificate for “sales and after sales” *or equivalent* is required (mandatory starting from 1st January 2015).

Example: Management of supply and maintenance of filtration equipment”

II.2. Specific requirements and quality management

II.2.1. Acceptance criteria

For the test to be acceptable, the depth of the filters (for bag and V-Type filters) shall not differ from the claimed value by more than:

- +/- 15 mm
- *+/- 5 mm for V-type and panel filters and pleated filters*

When tested in the independent laboratory, the obtained results shall not differ from the claimed values by more than:

Performance	Acceptance criteria	High Deviation
Initial pressure drop: at 50%, 100%, 75% and 125% of the nominal airflow	+(10%+Mt) or +(10 Pa + Mt) whichever largest where Mt = 5Pa (measuring acceptance criteria as allowed by EN ISO 16890)	+(20%+Mt) or +(20 Pa+Mt) whichever is the largest, where Mt = 10 Pa
Initial pressure drop: at 0.944 m ³ /s airflow (for filters from Energy Efficiency Class A+ to D only)		
ePM ₁ , ePM _{1,min} , ePM _{2.5} , ePM _{2.5,min} and ePM ₁₀ efficiencies	-7%-point and ≥50% for declared ePM _x group	-15%-point
ePM _x group	as claimed or higher	
Annual energy consumption	+10%+ 60 kWh/y	+20%+60 kWh/y

II.2.2. Energy Efficiency Classification and Labelling

Table 1: Energy efficiency class limits for each filter class according to EN ISO 16890 measured at 0.944 m³/s.

M _x = 200 g (AC Fine)	AEC in kWh/y FOR ePM ₁ (ePM ₁ and ePM _{1,min} ≥ 50%)					
	A+	A	B	C	D	E
50&55%	800	900	1050	1400	2000	>2000
60&65%	850	950	1100	1450	2050	>2050
70&75%	950	1100	1250	1550	2150	>2150
80&85%	1050	1250	1450	1800	2400	>2400
>90%	1200	1400	1550	1900	2500	>2500
M _x = 250 g (AC Fine)	AEC in kWh/y FOR ePM _{2.5} (ePM _{2.5} and ePM _{2.5,min} ≥ 50%)					
	A+	A	B	C	D	E
50&55%	700	800	950	1300	1900	>1900
60&65%	750	850	1000	1350	1950	>1950
70&75%	800	900	1050	1400	2000	>2000
80&85%	900	1000	1200	1500	2100	>2100
>90%	1000	1100	1300	1600	2200	>2200

M_x = 400 g (AC Fine)	AEC in kWh/y FOR ePM10 (ePM₁₀ ≥ 50%)					
	A+	A	B	C	D	E
50&55%	450	550	650	750	1100	>1100
60&65%	500	600	700	850	1200	>1200
70&75%	600	700	800	900	1300	>1300
80&85%	700	800	900	1000	1400	>1400
>90%	800	900	1050	1400	1500	>1500

Examples:

- declared value: ePM₁ 66% / measured ePM₁ efficiency = 59% → passed
- declared value: ePM₁ 54% / measured ePM₁ efficiency = 48% → failed and rerate in ePM_{2,5} group (MVF = 1)
- declared value: ePM₁ 77% and ePM_{1, min} 72% / measured ePM₁ efficiency = 62% and measured ePM_{1, min} efficiency 48% → failed and rerate in ePM_{2,5} group (MVF = 2)

II.2.3. Traceability¹

The traceability of products as required in standard ISO 9001:2015 must be ensured by all participants. In some cases, such as a complaint or non-conformity, Eurovent Certita certification is entitled to ask a participant/applicant to provide information as per the origin of a specific product.

II.2.4. Management of customer claims

Customer claims 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 Air Filters by the following means.

We remind you that the label (and/or trademark) described in the present document is /are Eurovent property, and does not allow you to cite, reproduce or use in any manner on any support said label/ trademark without being certified.

Any unauthorized use of said label/ trademark will be followed by legal pursuits.

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

The Eurovent Certification mark consists of:

- Eurovent Certification mark in conformity with the design as presented in the Certification Manual, Appendix G. The accepted color combinations consist of green pantone n°341 on white, or black on white. Any size of Eurovent Certification mark may be used.

¹ See minutes of the Programme Committee meeting held on 25 September 2018.



Figure 1: Illustration of the EUROVENT CERTIFIED PERFORMANCE (ECP) mark

II.3.1. Display of Eurovent Certified Performance logo on certified products

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

The Eurovent Certification Performance logo may be affixed on each product or applied as part of the product label.

II.3.2. Display of Eurovent Certified Performance logo on commercial and technical documentation

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

The Participant shall indicate his participation in the Programme by displaying the appropriate Eurovent Certified Performance mark on all specification sheets and in other literature carrying ratings, or claiming certification of certified models, in accordance with the Certification Manual, Appendix G.

The Eurovent Certified Performance mark alone may be used in literature without certified performance data (general leaflets, advertising etc).

When used in literature containing the certified performance data (technical catalogues and leaflets) the Eurovent Certified Performance mark shall be used only once and shall be associated with the following statement (e.g. by footnote):

NAME OF COMPANY participates in the Eurovent Certified Performance Programme for: NAME OF PROGRAMME; Check ongoing validity of certificate online: www.eurovent-certification.com

a. Display of ratings according to standards other than EN ISO16890:2016

All ISO ePM₁, ISO ePM_{2.5}, ISO ePM₁₀ air filters shall be rated at least according to EN ISO16890:2016. If other ratings are given next to ECP mark, it shall be clearly stated that only the EN ISO16890:2016 rating is certified.

b. Display of Eurovent Energy Efficiency rating on filters with face dimensions different from 592x592 according to EN 15805:2021 in literature, selection programmes and advertising

Filters with face dimensions different from 592x592 according to EN 15805:2021 but which dimensions are listed in Table 1 of EN 15805:2021 or in Table 2 below can be rated according to §I.2 with the same energy class as the certified filters with the standard size belonging to the same filter family (see definition of filter family in §I.3).

Table 2: Filter face dimensions as listed in Table 1 of EN15805:2021

Filter face dimensions (Header dimensions)	
Width (mm)	Height (mm)
592	592
490	592
592	490
287	592
592	287
287	490
490	287
287	287

Table 3: Additional sizes authorized for labelling

Filter face dimensions (Header dimensions)	
Height or Width (mm)	Height or Width (mm)
490	490
592	892
490	892
287	892

c. Marking requirements for products marked with two brands at the same time

In addition to the provisions laid down in the Certification Manual (CM 20th Ed., art.175), the following requirements apply:

If the distributor or reseller doesn't change anything on the product (label, packaging, technical documentation...) the requirement is not applicable.

If the label on the filter contains 2 tradenames, one for the certified company and the second one for the end customer (including installation companies), the requirement is not applicable.

If the distributor or reseller have changed something on product (label, packaging) with the agreement of the participant, the requirement is applicable.

If the commercial/technical documentation of distributor leads to any confusion about the certification, the requirement is applicable.

II.3.3. Eurovent Certified Performance energy labels

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

It is not mandatory to use Eurovent Certified Performance energy labels however it is highly recommended to do so. If an energy label is used by the participant, it is mandatory to use the layout described on our website.

High resolution files of these labels, as well as specifications for the layout are available on the website in the manufacturer's restricted area.

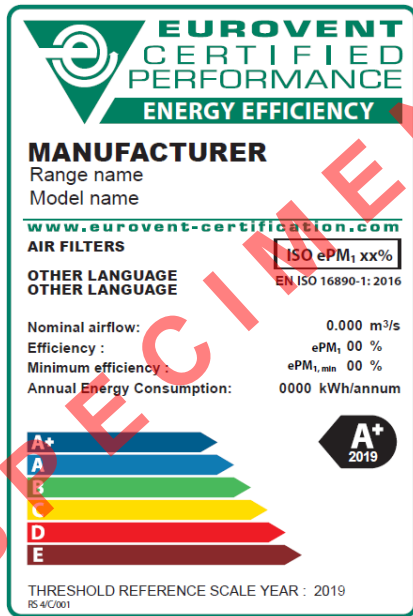


Figure 2: Illustration of the AIR FILTER Energy Efficiency Mini Labels



Figure 3: Illustration of the AIR FILTER Energy Efficiency Labels

III. CERTIFICATION PROCESS

III.1. Admission procedure

III.1.1. Declaration file

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: declaration file with brochures, technical data sheets, literature etc. for each ISO ePM₁, ISO ePM_{2.5} and ISO ePM₁₀ filters according EN ISO 16890-1:2016 he is selling on the market.

The applicant has to categorize all his ISO ePM₁, ISO ePM_{2.5} and ISO ePM₁₀ filters into a filter family, as defined in §1.3

- 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. These forms 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

Sales documentation shall be supplied for each filter family as an Excel file containing the following information:

- Model/type code
- Product category (e.g. Bag, V-type)
- Filter media
- Basic construction details, number of pockets or "V-shaped" related to a front frame with a size of 592x592 mm according to EN 15805:2021,
- filter depth
- Face dimensions
- Nominal flow rate
- Initial pressure drop *at 50%, 75%, 100% and 125% of the airflow rate*
- ePM₁, ePM_{1,min}, ePM_{2.5}, ePM_{2.5,min} and ePM₁₀ efficiencies according EN ISO 16890
- Eurovent Energy Efficiency Class according to II.2.2²
- Annual Energy Consumption according to Eurovent Document 4/21 (*Eq. (1a)*).
- Filter frame material within a filter family may differ
- Filter ISO class rating according to EN ISO 16890.

If an ISO ePM₁ or ISO ePM_{2.5} or ISO ePM₁₀ filter cannot reach the minimum dust holding capacity defined in Eurovent Document 4/21 – 2019 *or if the filter is declared with energy class E, ">XXX" will be displayed on the Eurovent Certified Performance website with "XXX" the threshold between energy class D and energy class E corresponding to the filter class of the filter*³. If this filter is selected for test, the energy efficiency calculation according to Eurovent Document 4/21 – 2019 *is not performed*.

All actual printouts of the brochures as published on the participant's homepage (*main and local*) must be sent to Eurovent Certita Certification *at the beginning of the certification campaign (admission and surveillance)*. Eurovent Certita Certification will check if the data for the excel list are identical to the ones published in the brochures. In addition, an actual certificate for the applicant's quality management system must be supplied.

In reporting models for certification and for publication on the Eurovent Certified Performance website, certified ratings shall be given for all Air Filters which meet the requirements of this TCR Standard.

Besides current models, the applicant shall provide Eurovent Certita Certification the list of New models (see Appendix D of the Certification Manual).

² Eurovent Document 4/21 can be downloaded free of charge on Eurovent association website: <http://www.eurovent-association.eu> .

³ See minutes of the Programme Committee meeting held on 15 March 2012.

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It is authorized to declare the performance of one filter for different air volume flows⁴.

Confidentiality of Certification Data: All data submitted to Eurovent Certita Certification is confidential except for information authorised to be published on the Eurovent Certified Performance website.

A full EN ISO16890-1:2016 and EN ISO16890-3:2016 (except for model with Energy Efficiency Class “E”) test reports shall be sent to ECC for 100% of the listed filters.

The format of the internal test reports are free. However, the content shall include all necessary information to be compared without any confusion (models name, size, nbr of pockets...) with the declaration list.

If the product achieves an energy rating better than E then the annual energy consumption is mandatory and it has to be display in kWh/y.

In addition, when a new model is declared, ECC check the corresponding internal test report and compare the following items with the declaration list:

- *Name of the models*
- *Initial pressure drop @100% nominal airflow and @0.944 m³/s airflow*
- *All Efficiencies ePM₁, ePM_{1,min} ePM_{2,5}, ePM_{2,5,min} and ePM₁₀*
- *AEC*

ECC will rerate automatically the performance when necessary as follows:

When a declared value is out of tolerance regarding the internal test report, the performance shall be rerated according to the test measured value or lower (for efficiency values) and higher (for Annual energy consumption or initial pressure drop), respectively.

Case 1 : performance declared within the tolerance regarding the internal test reports

<i>Performance</i>	<i>Declaration list</i>	<i>Internal test reports</i>	<i>ECC Validation</i>
<i>Intinial Pressure drop @100% airflow (Pa)</i>	<i>106</i>	<i>98</i>	<i>106</i>
<i>ePM_{1,av} (%)</i>	<i>86</i>	<i>89</i>	<i>86</i>
<i>ePM_{1,min} (%)</i>	<i>86</i>	<i>89</i>	<i>86</i>
<i>ePM_{2.5,av} (%)</i>	<i>90</i>	<i>93</i>	<i>90</i>
<i>ePM_{2.5,min} (%)</i>	<i>90</i>	<i>93</i>	<i>90</i>
<i>ePM_{10,av} (%)</i>	<i>94</i>	<i>98</i>	<i>94</i>
<i>AEC (kWh/y)</i>	<i>1200</i>	<i>1100</i>	<i>1200</i>

ECC treatment : No change of the declaration list

⁴ See minutes of the Programme Committee meeting held on 15 March 2012.

Case 2 : performance declared out of the tolerance regarding the internal test reports

<i>Performance</i>	<i>Declaration list</i>	<i>Internal test reports</i>	<i>ECC Validation</i>
<i>Intinial Pressure drop @100% airflow (Pa)</i>	106	132	132
<i>ePM1,av (%)</i>	86	75	75
<i>ePM1,min (%)</i>	86	75	75
<i>ePM2.5,av (%)</i>	90	83	90
<i>ePM2.5,min (%)</i>	90	83	90
<i>ePM10,av (%)</i>	94	87	94
<i>AEC (kWh/y)</i>	1200	1400	1400

ECC treatment :

- *Immediate change of the declaration list (above in red only)*
- *The participant is informed about the rerated performance.*
- *Possibility to change the declaration list*

Measuring devices & Calibration test reports:

If the participant provides external test reports, then he shall also provide the ISO 17025 certificate of the laboratory used (except if it is a laboratory used by ECC).

If the external laboratory is not accredited according to ISO 17025, then the participant shall ask to its supplier the calibration reports defined below and to provide them to ECC.

If the participant provides internal test reports, then he shall provide ECC with the calibration test reports of the relevant measuring devices at least every 2 years. The measuring devices are at least:

- OPC
- Pressure sensors

These reports shall be provided at the start of the campaign⁵ and shall be valid on January 31st of each years

The applicant shall declare all their production places around the world in accordance with §II.1.2⁶ with the corresponding ISO 9001 certificate.

III.1.2. Admissibility of the application

The provisions of the Certification Manual apply.

The declaration list is checked according to the requirement in §III.1.1

III.1.3. Implementation of checking operations

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

⁵ See minutes of the Programme Committee meeting held on 3 April 2019

⁶ See minutes of the Programme Committee meeting held on 3 April 2019

The excel file Declaration file FIL-1 filled by the Applicant shall be submitted to the Programme Committee FIL (PC-FIL) for a review the declared performances with a deadline of 15 days. The file submitted shall be in anonymous format, with no reference to the Applicant name, trade name, range name, or product reference.

III.1.3.1 Initial admission sampling

During the sampling, a partial check of the catalogue⁷ will be carried out by the auditor to verify the consistency of the performances with ECC website.

The auditor will select randomly 10% of models, if possible, with different range, type, depth, nbr of pockets...

Nbr models in declaration lists	<=25	>=26 and <=50	>=51 and <=75	>=76 and <=100	>=101 and <=150	>=151 and <=200
Check of 10%	3	5	8	10	15	20

Any deviation shall be recorded in the sampling report and it need to be corrected by the participant within 1 month.

III.1.3.2 Selection of filters to be tested

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

Based on the review from PC-FIL, Eurovent Certita Certification shall select six air filters elements from different filter families when possible. In addition, ECC will decide the production places where the selected filters shall be produced in accordance with the declaration of the production factories (see §III.1.1). Eurovent Certita Certification allocates an Identification Number (ID) for each filter to be tested before sending it to the laboratory. Eurovent Certita Certification is the only one deciding the random distribution of the test filters to the independent laboratories.

a. Sampling

A representative person of ECC shall contact the manufacturer in order to plan the sampling date in one of the storage location or production place declared by the manufacturer. The representative person of ECC also sends a list of all filters that could be sampled. The applicant may add additional explanation on filters with specific production condition, availability (if any) etc.

Introduction meeting: The ECC representative shall present the aim of the sampling. The manufacturer representative shall list all the areas on the site where certified filters can be sampled.

Sampling: ECC will select 1 filter element from 6 certified filter references for testing according to EN ISO16890:2016. Within these 6 filters, one specific filter can be selected from the declaration list by the ECC representative even if it is not available on site. This filter may be manufactured during the sampling or after the sampling date. The other filters are sampled according to availability on production lines and/or storage. Sampling on different batches shall be done when possible.⁸ In order to sample filters for the potential second test, 1 additional filter will be sampled for each reference. The selected filter elements will be packed in a box and marked and sealed by the ECC representative and photos of the marked/sealed boxes will be taken. These photos will be sent by ECC to the selected independent laboratory.

Note for filter mats samples:

⁷ See minutes of the Programme Committee meeting held on 13 May 2012

⁸ See minutes of the Programme Committee meeting held on 4 March 2020

For a filter mat to be tested, 2 samples of at least Length 2.5 m and Width 1.5 m to have at least 1m² sheet each shall be sampled (2 samples in case of 2nd test).

Conclusion meeting: The manufacturer representative signs a sampling sheet detailing the place and date of the sampling, the name of the ECC representative and the manufacturer representative, the references and serial numbers of the filters sampled, the address of the independent laboratory selected by ECC and the deadline for delivery. The ECC representative will report how the sampling proceeded and this report will be signed by both ECC and manufacturer representatives.

b. Delivery

The manufacturer will deliver the selected filters not later than 2 weeks after the sampling date.

III.1.3.3 Tests at the independent laboratory

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

Eurovent Certita Certification scheduled tests shall be performed at the Independent Laboratory selected by Eurovent Certita Certification.

Before testing, the laboratory shall check the product against the information declared in the technical datasheet to ensure that the filter corresponds to the selection (e.g. filter type, number of pockets, filter area, filter class and nominal air flow rate written on the filter).

Only the independent laboratory personnel shall be permitted to handle the test filters.

The laboratory shall not perform the test and contact EUROVENT CERTITA CERTIFICATION:

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

EUROVENT CERTITA CERTIFICATION will contact the applicant to give instructions regarding further actions.

The laboratory shall be responsible for correct storing, unpacking, handling, and testing. Filters that passed the test will be disposed of by the laboratory in agreement with Eurovent Certita Certification. The laboratory personnel may make repairs of the test filter elements unit only in agreement with the Applicant.

No Applicant's personnel are allowed to be present in the test facility during the test.

a. Time limitation of acquisition and recovery of filters

The provisions of the Certification Manual apply.

Once all the tests for the campaign are finished, the applicant may recover the remaining filters that were not tested. The applicant must inform ECC about its decision within one month after the reception of the last test results report.

b. Test conditions

The tests shall be conducted at the following conditions:

All independent laboratories must use the same test dust producer for a given test campaign. Before each test campaign independent laboratories will inform the participants on which test dust producer will be used. Applicant (participant not yet certified) can request from Eurovent Certita Certification information on the test dust producer used during the previous test campaign.

All tests shall be done with a temperature of 23 °C +/- 5 K and a relative humidity of 45% +/- 10 %.

Note: The testing of all filters shall be based on dust from the same source.

The tests must be performed in the following order:

- Initial pressure drop at 50%, 100%, 75%, 125% *of the nominal airflow and at 0.944 m³/s airflow*

- Initial fractional efficiency curve from 0,3 µm to 10 µm
- Discharged fractional efficiency curve from 0,3 µm to 10 µm
- Determination of the ePM_x group
- Dust Load
- Energy class calculation

Note: During the 1st test, if the Participant/Applicant asks to continue the test after the failure regarding the ePM_x group then the laboratory shall use the correct dust amount defined in Eurovent Document 4/21 – 2019 acc. to the measured ePM_x group.

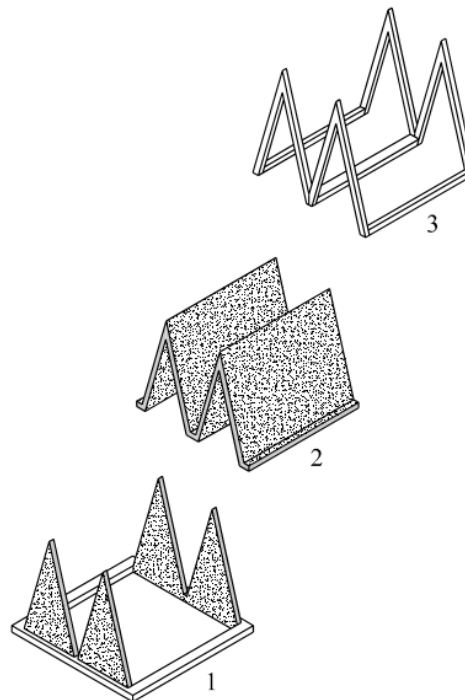
For a second test, the laboratory shall use the correct dust amount defined in Eurovent Document 4/21 – 2019 acc. to the measured ePM_x group during this 2nd test.

Note for filter mats tests:

The laboratory shall always prepare the sample in a W-shaped frame system.

Figure 4 describes a typical W-form construction which could be used for evaluating filter material. The W-form gives one square meter (1 m²) net effective filtering area, and therefore, the same figures representing the flow rate (in m³/s) and the media velocity (in m/s). 0,4 m³/s gives 0,4 m/s through media.

The filter material to be tested shall be laid on the frame and stretched and fastened to the frame with the help of the counter frames.



Key

- 1 W-form frame
- 2 Filter material (1 m²)
- 3 W-form counter frame

Figure 4 - Example of W-form frame and details for testing filter material

c. Report of tests results

Upon completion of the tests on each filter, the Laboratory will render its complete report as PDF file to Eurovent Certita Certification and the Applicant. Eurovent Certita Certification will transmit a copy of the report together with reporting test result to the Applicant

For models tested, results are sent by Eurovent Certita Certification, showing the deviations between declared and measured data.

d. Failure treatment

Reasons of failure

After a failure, the applicant shall examine the reasons of the failure⁹.

The Applicant shall be authorised by Eurovent Certita Certification to examine the reasons of the failure on location or to have the filter returned. The laboratory must not dispose of the filters that failed.

Initial test failure

Prior to the test, the laboratory must visually inspect each filter. Should the aspect be suspect, the Applicant and Eurovent Certita Certification are contacted by the laboratory.

In case of a damaged filter element, the laboratory shall inform Eurovent Certita Certification immediately and make a notice to the Applicant. The Applicant shall then send a new filter of the same model.

General

A unit failure is automatically confirmed when the test results are not in accordance with claimed data, according to acceptance criteria's specified in §II.2.1, except if there is an error of the test laboratory or a damage of the filter the Applicant is not responsible for.

In case of a unit failure occurred, the Applicant has within 4 working weeks after notification of failure to select one of the following alternatives:

1. Re-rate the product in accordance with the re-rating rules;
2. Ask for a second test. In case this second test is successful, no re-rating will be required. In case the second test is unsuccessful, the Applicant shall comply with point 1.

During the first test, when the filter does not meet the claimed performance, the laboratory shall inform Eurovent Certita Certification and ask whether the test shall be continued or not. If the Applicant doesn't want the test to continue, then he must send to Eurovent Certita Certification a written note. Then a second test is mandatory. In case this second test is successful, no re-rating will be required. In case the second test is unsuccessful, the Applicant shall comply with point 1 above.

In case the applicant asks a second test on a new model than the one already sampled, then this new model shall be sampled on site within 2 months. One penalty test will be required during the following test campaign. This sampling can be done remotely.

Note: During the 1st test, if the Applicant asks to continue the test after the failure regarding the ePM_x group then the laboratory shall use the correct dust amount defined in Eurovent Document 4/21 acc. to the measured ePM_x group.

Rating requirements

The tested filter shall be re-rated according to the test results. For the initial pressure drop, the re-rated value is the measured value rounded to the nearest multiple of 5 Pa.

⁹ See minutes of the Programme Committee meeting held on 25 September 2018

MVF value > 10% (see description in Appendix B)

When a model is rerated, the participants/applicant has to decide to rerate by default the whole range impacted (filters within the same range, same ISO group and efficiency, with the same type of media) or to test 2 additional filters (with the minimum length and number of bags and the maximum length and number of bags) from this range in the same campaign. In case of failure for one of these additional filters, the rerate of the whole range would be applied.

For participant with MVF>10%, a 2nd sampling must be done for the dedicated additional filters and sent if necessary, to the laboratory.

Rating requirements when MVF > 10%

Application of the percentage of the deviation of the model tested to the model(s) with same range, same ISO group and efficiency, with the same type of media for initial pressure drop and AEC.

Application of the deviation value of the model tested to the model(s)) with same range, same ISO group and efficiency, with the same type of media for efficiencies.

Model tested			
	Pressure Drop (Pa)	Effic. (%)	AEC (kW/y)
Declared	55	78	1000
Measured	72	70	1200
Deviation	-17 (31%)	-8	-200 (-20%)
Rerate	72	70	1200

Model(s) of the same "range"			
	Pressure Drop (Pa)	Effic. (%)	AEC (kW/y)
Declared	52	80	870
Deviation	-16 (-31%)	-8	-174 (-20%)
Rerate	68	72	1044

III.1.3.4 Software checking procedure

Not applicable

III.1.3.5 Desk study

Not applicable

III.1.4. Evaluation and decision

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

When results of tests are within the allowed acceptance criteria defined in §II.2.1, the laboratory shall provide Eurovent Certita Certification with a test report (which includes the name of the manufacturer). The laboratory test reports shall always present measured performances. The interpretation of the results belongs to ECC (See Interpretation of test results in Appendix C)

In any case the report shall contain a table presenting all claimed, measured, and allowed performance values as follow:

Property	Claimed	Measured	Allowed
Initial pressure drop @ 100% airflow			
Initial pressure drop @ 50% airflow			
Initial pressure drop @ 75% airflow			
Initial pressure drop @ 125% airflow			
<i>Initial pressure drop @ 0.944 m³/s airflow</i>			
ePM ₁			
ePM _{1,min}			
ePM _{2.5}			
ePM _{2.5,min}			
ePM ₁₀			
Filter class			
Annual energy consumption			
Energy efficiency class			

If during the 1st test, the results of are not in accordance with the requirements defined in §II.2.1 the laboratory shall generate a test report corresponding to the ID Number. Participant name must not be stated on that report. It is provided only to Eurovent Certita Certification who shall inform the participant. In that case, the procedure for failure treatment shall be applied.

The following statement shall appear on all the test reports: “Determination of filtration performance for certification of ISO ePM₁, ISO ePM_{2.5}, ISO ePM₁₀ filters”.

If all the test results are in accordance with the requirements of §II.2.1 or rerated and if the requirements regarding the Mean Value of Failure (MVF) in Appendix B, all products sold EN ISO 16890-1:2016 classes ISO ePM₁, ISO ePM_{2.5}, ISO ePM₁₀ are certified by Eurovent Certita Certification. The certification is granted until the date defined in Appendix A.

III.1.4.1 Penalty tests

One (1) additional filter will be selected in case of high deviation as defined in II.2.1 for:

- The initial pressure drop
If one or more of the pressure drops performance are failed (50%, 75%, 100%, 125% *and at 0.944 m³/s*) acc. to the high failure, a penalty test will be asked during the next campaign.
- The Annual Energy Consumption.
- The efficiency value

If a second test is asked by the applicant, only the results of the second test will be considered. Each test leading to a high failure will lead to one penalty test (however there is a maximum of one penalty test per filter tested). Several penalty tests can therefore be asked during one test campaign.

This additional selection shall be made immediately, and the test must be validated before the certification is granted.

III.1.4.2 Non application of procedures

Non-application of procedures and relevant penalties are described in the Certification Manual, Section III.4.

III.1.4.3 Publication of certified data by Eurovent Certita Certification

The certified data of the certified products are published on Eurovent Certified Performance 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 to each model certified shall be published on the Eurovent Certified Performance website:

- Name of Company
- Trade or brand name of model
- Model name
- Filter media
- Basic design
- Pocket length
- Face dimensions (592x592 according to EN 15805:2021)
- Nb of pockets or “V”s
- Nominal air flow rate
- Initial pressure drop at 50%, 75%, 100% and 125% of the air flow rate *and at 0,944 m3/s airflow*
- ePM₁, ePM_{1,min}, ePM_{2.5}, ePM_{2.5,min} and ePM₁₀ measured efficiencies
- Eurovent Energy Efficiency Class NEW
- Annual Energy Consumption NEW
- ISO efficiency rating according to EN ISO16890:2016

III.2. Surveillance procedure

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

Once certified, the Applicant is called Participant.

Every year, Eurovent Certita Certification checks whether the certified products still meet the requirements. An update of the declaration file is asked to the participant according to campaign schedule. In case of modification of the models, §III.3.4 and/or §III.3.5 apply.

III.2.1. Implementation of surveillance operations

In addition to the provisions laid down in the Certification Manual, the requirements described in §III.1.1 apply:

However:

- the anonymous Declaration file FIL-1 files shall not be submitted to the Programme Committee for review
- Further to the independent tests made by Eurovent Certita Certification, a full EN ISO16890-1:2016 and EN ISO16890-3:2016 (except for model with EEC with “E”) test reports shall be sent for all new declared filters. All new reports should be sent with the updated declaration list. In case of missing information, the update on the declaration list (including on the ECC internet webpage) will be delayed until full reception of the information.

III.2.1.1 Surveillance sampling

In addition to the provisions described in §III.1.3.1, the following requirements apply:

The auditor will also check the conformity of the use of the ECP marking on product and commercial/technical documentation.

Any deviation shall be recorded in the sampling report and it need to be corrected by the participant within 1 month.

III.2.1.2 Selection of filters to be tested

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

The procedure described in §III.1.3.2 is repeated annually. However, Eurovent Certita Certification shall select four air filters elements from different filter families.

III.2.1.3 Surveillance tests

In addition to the provisions laid down in the Certification Manual, the requirements described in §III.1.3.3 and following requirements apply:

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

- Scheduled tests in admission procedure
- Scheduled tests in surveillance procedure
- Penalty test
- Complaint test (challenge procedure)

Eurovent Certita Certification retains the right to make anticipated tests in case of:

- Modification of the declared list out of the certification schedule (additional filters or modification of already listed filters; see §III.3.4);

Eurovent Certita Certification retains the right to make additional tests in case of:

- Complaint from a Participant’s customer;
- Complaint from a non-certified manufacturer;

- Following an internal checking of the declaration list or of the manufacturer's commercial documentation.

In these cases, the complainer (that is the participant's customer, the non-certified manufacturer or Eurovent Certita Certification) shall pay for the test. If the test confirms the non-compliance of one of the certified performances, the re-rating procedure shall apply, and the certified manufacturer must pay for the test.

III.2.1.4 software checking procedure

Not applicable

III.2.1.5 Desk study

Not applicable

III.2.1.6 Technical and commercial documentation check

In addition to the provisions laid down in the Certification Manual, the following requirements apply:
In case of rerating, the participant must correct its technical documentation within 8 weeks.

III.2.1.7 Challenge procedure

In addition to the provisions laid down in the Certification Manual, the following procedure for the challenge procedure apply:

1. Request of challenge procedure
2. Analysis by ECC of the complaint
3. Ask for additional information if needed by ECC
4. Invoice and payment of the fees (testing and general) to both involved parties (the complainant and the challenged participant)
5. Sampling on site should be organized within 1 month after the payment of the related invoices
6. Delivery of the filters within 2 weeks
7. Test in laboratory
8. Analysis and treatment of the results
9. Communication of the conclusion to both part
10. Credit note acc. to conclusion (to the complainant or the challenged Participant)

The whole procedure could be fulfilled within 3 to 4 months if all the deadlines are met.

During 1 sampling on site and if more than one model is under a challenge procedure, all general fees (administrative, sampling, travel cost...) are charged to the challenged Participant if at least one test result is out of tolerance.

III.2.2. Evaluation and decision

In addition to the provisions laid down in the Certification Manual, the requirements described in §III.1.4 apply and the following requirements:

If the participants fulfilled all previous test campaigns and provided all the necessary elements and delivered all the filters for the current campaign, the certification is renewed for another campaign.

III.2.2.1 Penalty tests

Each test leading to a high failure will lead to one penalty test for the next campaign (however there is a maximum of one penalty test per filter tested). Several penalty tests can therefore be asked during one test campaign.

III.2.2.2 Non application of procedures

Non-application of procedures and relevant penalties are described in the Certification Manual, Section III.4.

To come back to the certification programme, the suspended participant must complete the test campaign of the year he has been suspended for (n) and give all the necessary elements for the following test campaign (n+1).

III.2.2.3 Repeated failures along the test campaigns

The rules regarding Mean Value of Failure (MVF) are described in Appendix B

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 sites

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. Changes concerning the declaration list (model and/or range)

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

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

In reporting models for certification and for publication on the Eurovent Certified Performance website, certified ratings shall be given for all Air Filters which meet the requirements of this TCR Standard.

Besides current models, the Participants shall provide Eurovent Certita Certification the list of (see Appendix D of the Certification Manual):

- New models
- Deleted models,
- Obsolete models.

The participant shall inform Eurovent Certita Certification of all modifications of products that have relevance to the published data. Updated literature shall be sent to Eurovent Certita Certification as soon as available.

It is authorized to declare the performance of one filter for different air volume flows¹⁰.

Changes on performances of models never tested or rerated¹¹ can be authorized. Eurovent Certita Certification will check the consistency of the new data and validate them or not. Such changes shall always be justified by the manufacturer in order to be authorized. The filters concerned will be tested in priority during the following test campaign.

Confidentiality of Certification Data: All data submitted to Eurovent Certita Certification is confidential except for information authorised to be published on the Eurovent Certified Performance website.

III.3.5. Changes concerning the certified product

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

The participant shall inform Eurovent Certita Certification of any modification of the product portfolio by updating the declaration file (FIL-1). Non-compliance of the participant is considered as non-application of procedures (see §III.2.2.2).

EUROVENT CERTITA CERTIFICATION decides whether the modification is significant for the certified performance data or not. In the case of significant modifications EUROVENT CERTITA CERTIFICATION 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.

III.5. Publication of the certified performances

The certified data of the certified products are published on Eurovent Certified Performance 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 Eurovent Certified Performance website:

- Name of Company
- Trade or brand name of model
- Model name
- Filter media
- Basic design
- Pocket length
- Face dimensions (592x592 according to EN 15805:2021)
- Nb of pockets or "V"s

¹⁰ See minutes of the Programme Committee meeting held on 15 March 2012.

¹¹ See minutes of the Programme Committee meeting held on 15 March 2012.

- Nominal air flow rate
- Initial pressure drop at 50%, 75%, 100% and 125% of the air flow rate *and at 0,944 m3/s airflow*
- ePM₁, ePM_{1,min}, ePM_{2.5}, ePM_{2.5,min} and ePM₁₀ measured efficiencies
- Eurovent Energy Efficiency Class NEW
- Annual Energy Consumption NEW
- ISO efficiency rating according to EN ISO16890:2016

APPENDIX A. CAMPAIGN SCHEDULE

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

		Normal Schedule
1	Eurovent Certita Certification asks for up-date of product list and all production places	31/01/n
2	Participant confirms up-date of products list and provides list of production places	15/02/n
3	Eurovent Certita Certification send declaration list with all models with associated production place and sampling invoice	31/03/n
4	Validation by participant	30/04/n
5	Sampled filters are all sampled	30/06/n
6	Sampled filters are all delivered	15/07/n
7	All payments from Participant are completed	31/07/n
8	Certificate are valid until	31/08/n+1
9	The Laboratory carries out all first tests	15/12/n
10	Eurovent Certita Certification sends the test reports	Date of reception of test report + 15 days

APPENDIX B. CALCULATION METHOD AND IMPLEMENTATION OF MEAN VALUE OF FAILURE (MVF)

B.I. General

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.

$$\text{MVF} = \frac{\sum \text{Number of measurements failed}}{\sum \text{Number of measurements performed}}$$

Mean Value of Failure *Number of considered years* *Number of considered years*

MVF considers the following performances:

- Initial pressure drop at 50% or 75% or 100% or 125%
- ePM₁, ePM_{1,min}, ePM_{2.5}, ePM_{2.5,min} and ePM₁₀ measured efficiencies
- ePM_x group
- Annual energy consumption

If one or more of the pressure drop performances are failed (50%, 75%, 100% and 125%), only one MVF will be noted.

When there is a second test on a filter, then the first test is not considered.

If the MVF is equal to 0%, one less filter will be selected for the next test campaign that is three tests will have to be performed instead of four.

A manufacturer is suspended from the Certification Programme for one year if the MVF is higher than 15%, starting campaign 2020, i.e. considering the results from the campaigns 2018-2019-2020.

B.II. Newcomers and admission procedure

During his admission procedure, the MVF shall not be higher than 15%. If the MVF is higher than 15%, the Applicant shall not be granted the certification.

After one year the applicant can apply again through the regular admission procedure.

The MVF limit for new participant will be applicable for their 1st surveillance year (including admission + 1st surveillance campaigns)

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

APPENDIX C. TEST RESULTS INTERPRETATION

The interpretation of the results belongs to ECC. The different cases are given hereunder with the corresponding interpretation.

C.I. All performances are within the tolerances

	Declaration	Measured
ePM1%	68	65
Group	ePM1	ePM1
%	65	65
EEC	Based on ePM1 65%	Based on ePM1 65%

Interpretation: there is no rerate

C.II. Some performances are out the tolerances

	Declaration	Measured
ePM1%	55	49
ePM2.5%	70	65
Group	ePM1	ePM2.5
%	55	65
EEC	Based on ePM1 55%	Based on ePM2.5 65%

Interpretation: rerate of failed value is done acc. to laboratory test report

C.III. All performances are within the tolerances, however, the filter ISO class is different from the declaration

	Declaration	Measured
ePM1%	65	59
Group	ePM1	ePM1
%	65	55
EEC	Based on ePM1 65%	Based on ePM1 55%

The measure of the EEC is done based on filter ISO class ePM_x XX% measured by the laboratory.

Interpretation:

Case 1: AEC is inside of tolerance, no rerate of the Energy Efficiency Class (EEC)

Case 2: AEC is out of tolerance, Rerate of the Energy Efficiency Class acc. to ePM_x XX% declared by the participant (because Measured efficiencies are inside of tolerance)

C.IV. All performances are within the tolerances, however, the ePM_x group measured is better than in the declaration

	Declaration	Measured
ePM1%	50	50
ePM2.5%	65	65
Group	ePM2.5	ePM1
%	65	50
EEC	Based on ePM2.5 65%	Based on ePM1 50% And for information based on ePM2.5 65%

The measure of the EEC is done based on filter ISO class ePM_x XX% measured by the laboratory. In addition, the EEC based on filter ISO class ePM_x XX% declared by the participant can be also displayed

Interpretation:

Case 1: AEC is inside of tolerance, no rerate of the Energy Efficiency Class (EEC)

Case 2: AEC is out of tolerance, Rerate of the Energy Efficiency Class acc. to filter ISO class ePM_x XX% declared by the participant (because Measured efficiencies are inside of tolerance)



Performances on line
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