



May 2012

**RECOMMENDATION
concerning
CLASSIFICATION
of
AIR FILTERS**

**EUROVENT
EUROPEAN COMMITTEE OF AIR HANDLING, AIR CONDITIONING AND
REFRIGERATION
EQUIPMENT INDUSTRIES**

Development of the European classification system for air filters for general ventilation

EUROVENT 4/5

EUROVENT 4/5 - 1980 was the first European air filter testing standard although national standards may have been published earlier. EUROVENT 4/5 was an adaptation of ASHRAE 52-76. Later, Eurovent published a separate leaflet "Recommended grading plan of air filters" which formed the basis of the European air filter classification system.

Pre-filters were classified into four grades (EU1–EU4) based on the average arrestance (A_m) for ASHRAE test dust. Fine filters were classified into five grades (EU5–EU9) based on the average dust spot efficiency. The minimum initial dust spot efficiency demand for fine filters was 20%. Final pressure drops for calculation of the average arrestance and average efficiency were not specified. EUROVENT 4/5 was also the basis for several national standards in Europe.

EN 779:1993

EUROVENT 4/5 was adopted as EN 779:1993 and the names of the filter classes were changed to G1-G4 respective F5–F9. The maximum final pressure drops for a classification of filters were defined: 250 Pa for G-class filters and 450 Pa for F-Class filters.

EUROVENT 4/9

EUROVENT 4/9 – 1993 introduced efficiency by particle size which replaced the old dust spot efficiency for determination of the fine filter performance. Fine filters were classified based on the average efficiency for 0.4 μm particles because it was close to the old average dust spot efficiency. Filters could still be graded into the same filter class as with the old dust spot method. The requirement for minimum 20% initial efficiency for fine filters was removed.

EN 779:2002

The revised EN 779:2002 adopted EUROVENT 4/9 method as a replacement for the dust spot method and also included a filter media discharging method in Annex A. This discharging method was an adoption of the NT VVS 117 method for determination of the discharged efficiency of electrostatically charged air filter media. Although Annex A was a normative part of the standard, it was not included in the filter classification.

Several discharge treatment methods were allowed to be used. The most used discharge treatment methods were liquid isopropanol (IPA) and diesel fume, which was described in EUROVENT Recommendation 18.

Diesel fume can be used to treat complete filters while IPA is suitable for treatment of filter media samples.

EN 779:2012

The new EN 779:2012 revision takes a further step in fine air filter classification by introducing a minimum efficiency requirement in addition to the average efficiency in classes F7–F9. The minimum efficiency is the lowest 0.4 µm particle efficiency measured during the complete filter test including discharge treatment of the filter media. The only allowed discharge treatment method is the IPA method which is used on media samples. A minimum of three media samples and a minimum total media area of 600 cm² shall be tested.

As EN 779:2012 has no minimum efficiency requirement for classes 5 and 6, the discharged efficiency of the media is not measured. Consequently, the filter class names have been changed to M5 and M6 to indicate that the test method for determination of the filter class is different from that used in filter classes F7-F9.

Air filter classification according to EN 779:2012 is presented in Table 1.

Table 1— Classification of air filters¹⁾ according to EN 779:2012

Group	Class	Final test pressure drop Pa	Average arrestance (A_m) of synthetic dust %	Average efficiency (E_m) of 0.4 µm particles %	Minimum Efficiency²⁾ of 0.4 µm particles %
Coarse	G1	250	$50 \leq A_m < 65$	-	-
	G2	250	$65 \leq A_m < 80$	-	-
	G3	250	$80 \leq A_m < 90$	-	-
	G4	250	$90 \leq A_m$	-	-
Medium	M5	450	-	$40 \leq E_m < 60$	-
	M6	450	-	$60 \leq E_m < 80$	-
Fine	F7	450	-	$80 \leq E_m < 90$	35
	F8	450	-	$90 \leq E_m < 95$	55
	F9	450	-	$95 \leq E_m$	70

NOTE

¹⁾ The characteristics of atmospheric dust vary widely in comparison with those of the synthetic loading dust used in the tests. Because of this the test results do not provide a basis for predicting either operational performance or life. Loss of media charge or shedding of particles or fibres can also adversely affect efficiency.

²⁾ Minimum efficiency is the lowest efficiency among the initial efficiency, discharged efficiency and the lowest efficiency throughout the loading procedure of the test.

Recommendation for the European Classification system

Certification tests of new filters and retests of filters shall be made according to EN 779:2012. However, as long as a complete filter test report according to the old EN 779:2002 exists there is no need to retest already certified/tested filters during a transition period of three years. The reasons for that are:

- In EN 779:2012 air filters in classes G1–M6 are tested and classified as in EN 779:2002.
- In EN 779:2012 air filters in classes F7–F9 shall, in addition, to the average efficiency, also fulfil the minimum efficiency requirement. A complete filter test report according to the old EN 779:2002 presents all the test results needed for classification of the filter also according to EN 779:2012. Although IPA treated efficiencies are demanded in EN 779:2012, results with diesel fume can be accepted as well.

Due to the new criteria for minimum efficiencies, the classification of F7-F9 filters may be updated and the report rewritten with the new filter class.

References

ASHRAE Standard 52-76 - Method of testing air-cleaning devices used in general ventilation for removal of particulate matter.

EN 779:1993 - Particulate air filter for general ventilation – Requirements, testing, marking

EN 779:2002 - Particulate air filters for general ventilation – Determination of the filtration performance.

EN 779:2012 - Particulate air filters for general ventilation – Determination of the filtration performance.

EUROVENT 4/5 – 1980, Method of testing air filters used in general ventilation.

EUROVENT 4/9-1993 - Method of testing air filters used in general ventilation for determination of fractional efficiency.

EUROVENT REC18 - Recommendation concerning Diesel fume / discharging test of air filters. 2009

NT VVS 117, Electret filters: Determination of the electrostatic enhancement factor of filter media. Nordtest 1997.

Recommended grading plan of air filters, Eurovent 1983.

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