

Synthetic filter media with progressive layer construction

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Pocket filters are widespread products for the filtration of ambient air in HVAC systems. EN 779: „Particulate air filters for general ventilation - Determination of the filtration performance“ regulates its testing and classification according to table 1. Since October, 2012 an amended version has been effective throughout Europe.

The most significant modification concerns the fine dust filters of the filter classes F7 to F9, which are not only evaluated according to their mean efficiency values but also, in addition, according to their so-called minimum efficiency value. These minimum efficiency values can be found with the help of the so-called IPA test where a filter sample is immersed in liquid Isopropanol (IPA) and is dried afterwards. This washing process reduces the electrostatic charge of the filter medium and is meant to simulate the kind of filtration behavior that can be expected under extremely critical real application conditions.

Fine dust filters whose filter principle is based on the separation effect through electrostatic charges loose this effect through the IPA test and cannot achieve the required filter class anymore. Numerous above all synthetic filter models fall back from the filter classes F7 and F8,

Table 1: Filter classes according to EN 779:2012

Filter Class	Average arresstance A_m	Average efficiency E_m	Minimum efficiency E_{min}
acc. to EN 779	(synthetic dust)	(DEHS-Aerosol @ 0,4µm)	(DEHS-Aerosol @ 0,4µm) after IPA treatment
	in %	in %	in %
G 1	$A_m < 65$	-	-
G 2	$65 \leq A_m < 80$	-	-
G 3	$80 \leq A_m < 90$	-	-
G 4	$90 \leq A_m$	-	-
M 5	-	$40 \leq E_m < 60$	-
M 6	-	$60 \leq E_m < 80$	-
F 7	-	$80 \leq E_m < 90$	$35 \leq E_{min}$
F 8	-	$90 \leq E_m < 95$	$55 \leq E_{min}$
F 9	-	$95 \leq E_m$	$70 \leq E_{min}$

sometimes even from class F9, get downgraded to M6 and cannot be used for their originally intended task anymore.

Compoplus® filter media in filter classes F7-F9 separate fine dusts clearly more efficiently than conventional filter media and furthermore, they have very favorable pressure drops. The Compoplus® filter layer construction is progressive, i.e. the fiber distances as well as the fiber diameters decrease in the direction of the clean air side.

For the highly effective filter layers special ultrafine Meltblown non-wovens were developed. These present an elevated separation efficiency towards ultrafine dusts since the mean fiber diameter was lowered from up to now approx. 2.5 µm to less than 1 µm (see fig. 1). By this measure alone, effective fiber surface area will increase in

future by approx. 150% and the efficiency values towards 0.4 µm of particles will rise substantially. Fig. 2 shows the separation curves and hence also the minimum efficiency values of Compoplus® filter media according to EN 779:2012.

This means that not only the fulfillment of the strict criteria of EN 779:2012 is possible. Moreover, it turns out to be an especially economic operating method with low pressure drops, flat pressure drop curves and long service lives. This helps in turn to obtain a positive energy rating, becoming increasingly important in future.

Besides, the filter user benefits from an added value in the form of higher purity of the air and air hygiene and an important overall social need for healthier living conditions and a purer environment is being sustainably reinforced.

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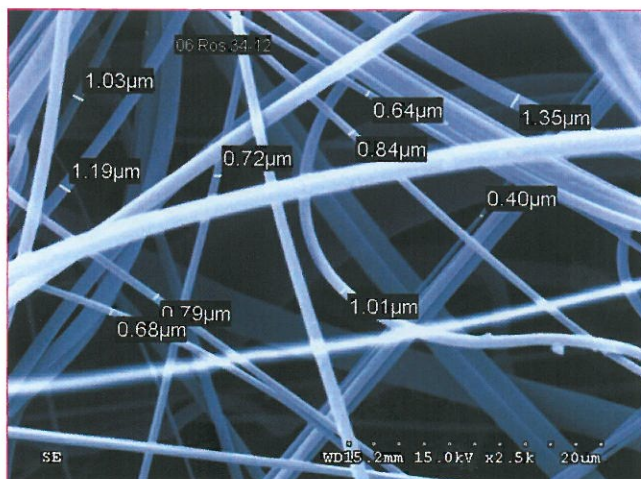


Fig. 1: Fiber structure of synthetic Compoplus® filter media

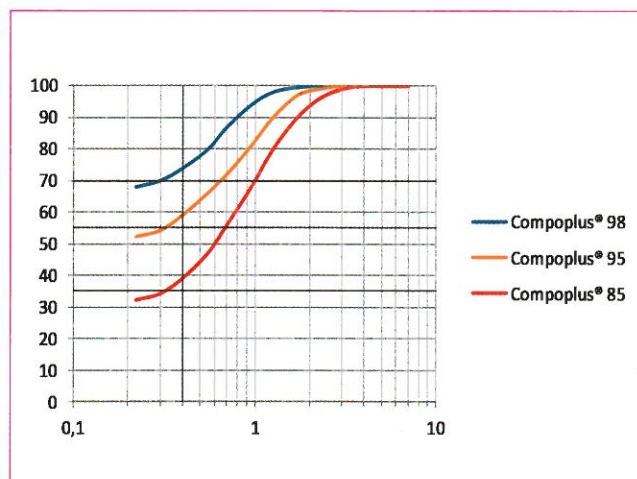


Fig. 2: Minimum efficiencies of Compoplus® filter media according to EN 779:2012