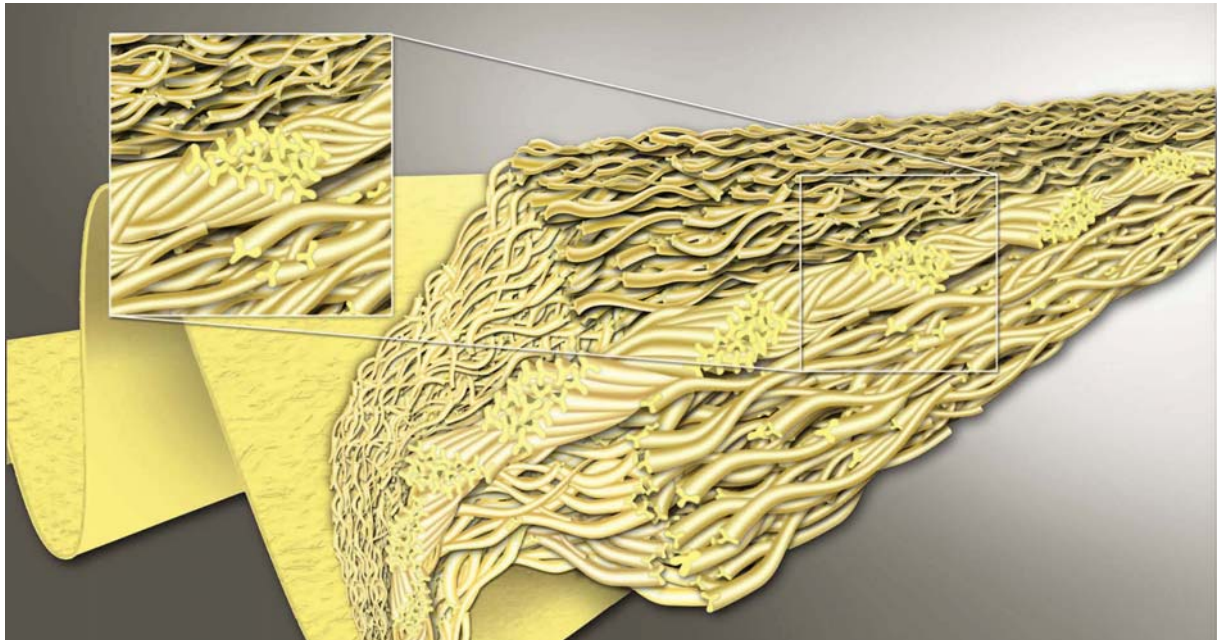


Filtration Efficiency Test

P84 calandered

P84 micro fibre felt

Nomex



- Tests on a test rig according to VDI 3926
- at 77°F
 - with asphalt dust

Investigated filter media

The test was made with 3 different needle felt types:

- P84 needle felt, scrimless, with silicone finish, calendered, weight: 13.5 oz/yd², P84 fibre titre: 2 den, air permeability: 8.5 ft³/ft².min
- P84 needle felt, scrim supported, blend of P84 0.9 and 1,5 den fibres at the filtration side, weight: 13.7 oz/yd², hydrophobic finish, air permeability: 27.9 ft³/ft².min
- Nomex needle felt, scrimless, weight: 18.2 oz/yd², air permeability: 23 ft³/ft².min

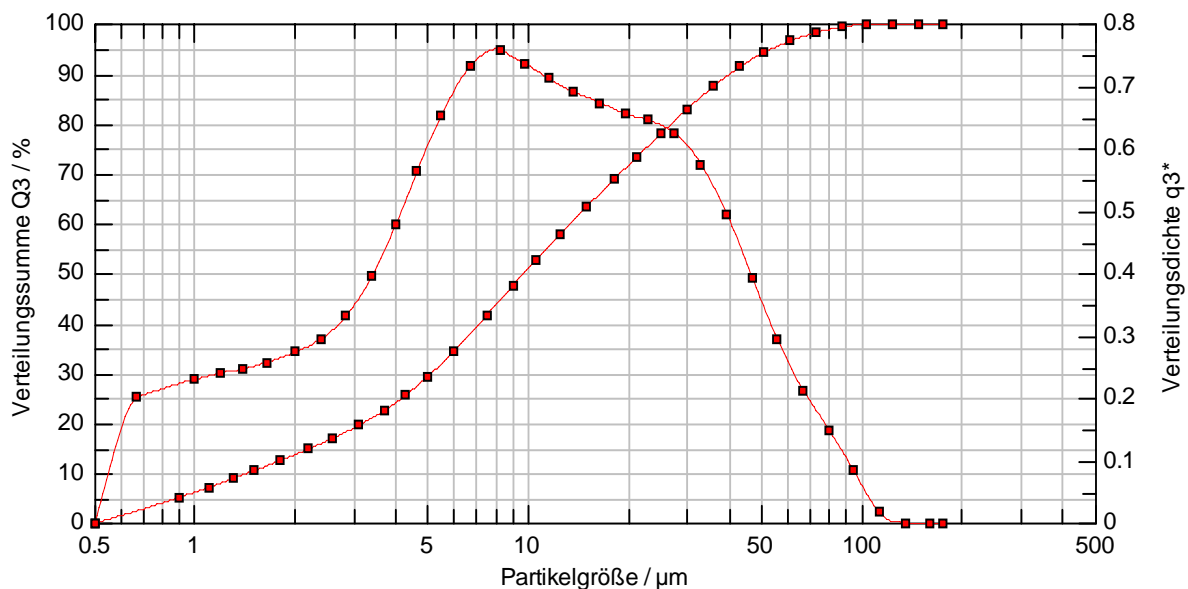
Test Conditions

Temperature: 77 °F
 Cleaning tank pressure: 72.5 PSI
 Valve opening time: 60ms

The dust concentration was elevated to app. 6.1 gr/ft³ in comparison to the standard tests with Pural NF (2.2 gr/ft³) because the used Astec asphalt dust is a less challenging dust.

Test dust

Test dust is asphalt dust (from Astec), the particle size distribution is displayed below.



Test Procedure

30 cycles at 6.6 ft/min air to cloth ratio, cleaning at reaching 4 in.W.C. differential pressure

30 cycles at 6.6 ft/min, cleaning at reaching 4 in.W.C. differential pressure

30 cycles at 9.8ft/min, cleaning at reaching 4 in.W.C. differential pressure

60 cycles at 13.1 ft/min, cleaning at reaching 4 in.W.C. differential pressure

After each sequence the differential pressure was measured at an air to cloth ratio of 6.6 ft/min before and after an additional cleaning pulse at 6.6 ft/min.

The clean gas concentrations were measured in each sequence by the gravimetric evaluation of an absolute-filter in the clean gas channel.

Results

First of all it has to be stated that the filtering concepts of the 3 investigated filter media is completely different:

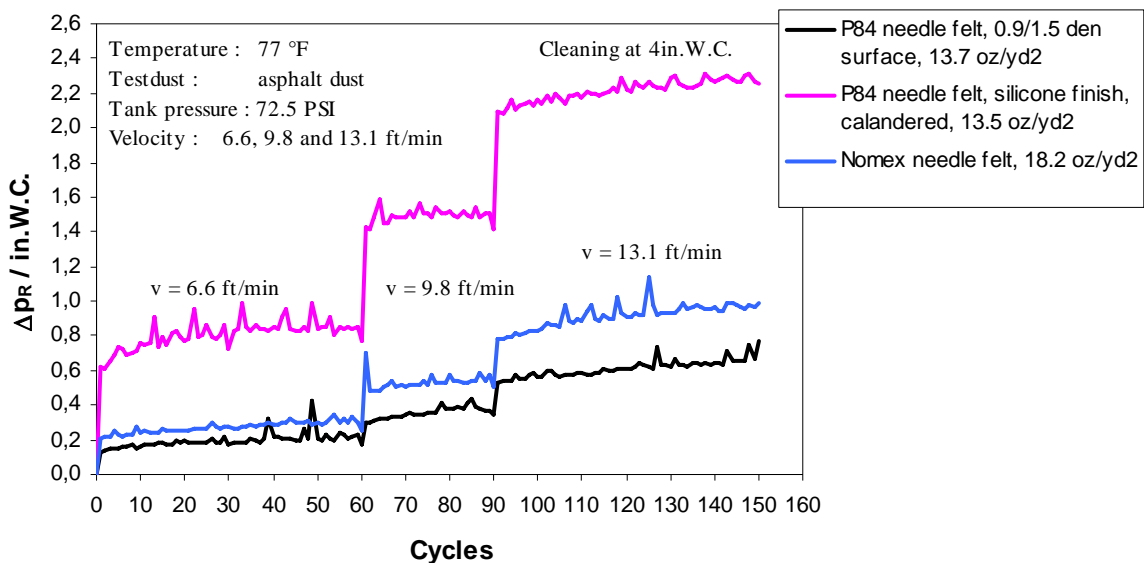
- The P84 felt with the silicone finish (sample a) works like membranes starting with a low air permeability of only 8.5 ft³/ft².min.
- The standard Nomex needle felt (sample c) on the other hand is heavy with 18.2 oz/yd² and an air permeability of 23 ft³/ft².min.
- The P84 needle felt with a blend of 0.9 and 1.5 den P84 fibres on the filtration side shows a fabric weight of 13.7 oz/yd² and an air permeability of 27.9 ft³/ft².min.

The P84 microfibre needle felt shows the best performance under test conditions. The filtration efficiency is higher than that of the Nomex felt even the P84 felt weight is lower and the air permeability slightly higher.

The calandered P84 felt achieves by far higher filtration efficiency than the other felts but cycle time and residual pressure drop are higher due to the lower air permeability of the felt during the test sequence.

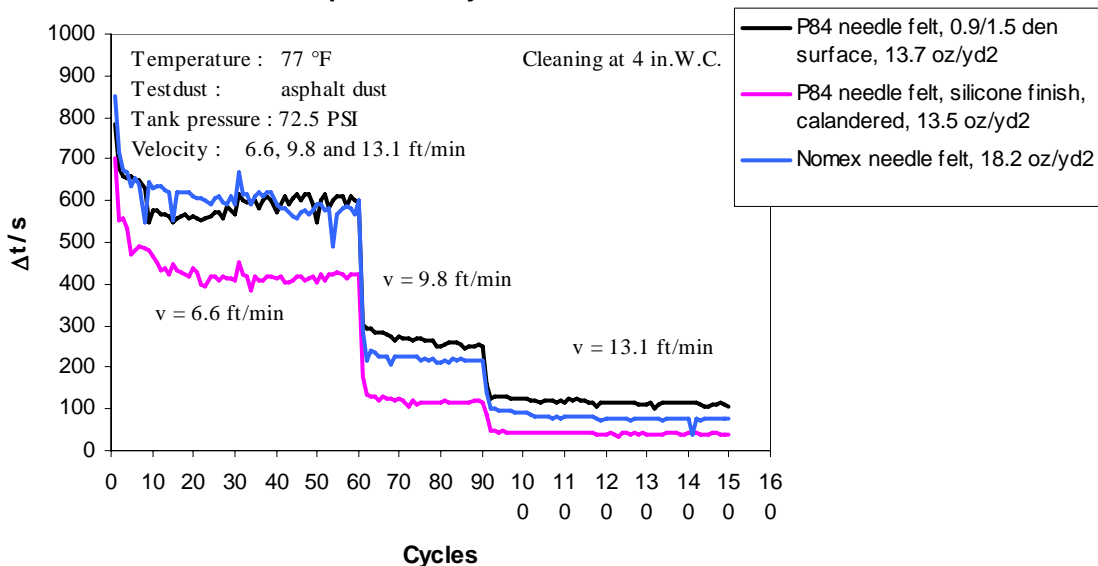
The results show that not only the fibre material (polymer, fibre cross section, fibre titre) but also the felt construction (felt density, surface treatment like calandring and also coatings) have significant influence on the performance and have to be optimised for each particular application..

Development of Residual Pressure Drop



Sample a) over all 4 sequences shows the highest differential pressures but the lowest clean gas dust contents. The consequence is that the cleaning cycle time at the air to cloth ratio of 13.1 ft/min is app. one third of the P84 felt with fine fibres (sample b) or app. two thirds of the Nomex felt (sample c).

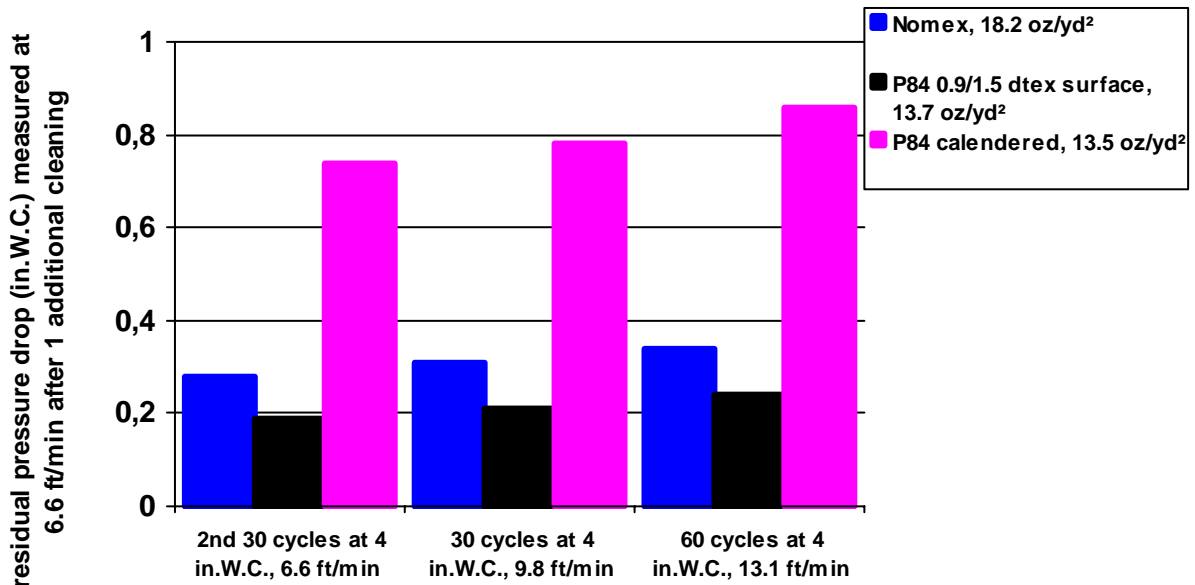
Development of Cycle Duration



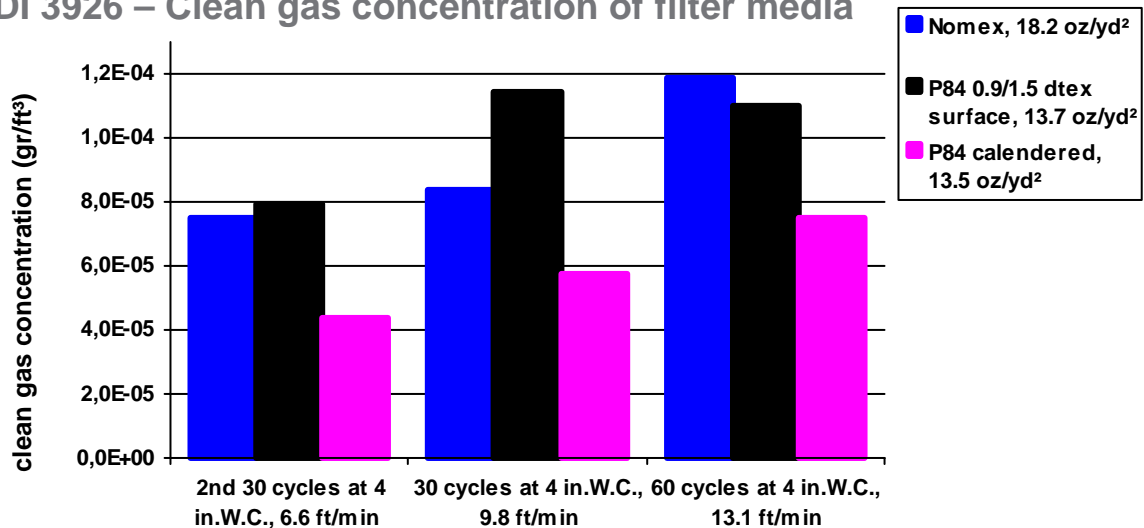
With regards to differential pressure and the cleaning cycle times the P84 needle felt with the 0.9/1.5 den fibre blend on the filtration side show the best results. But the clean gas dust content is higher compared to the calandered and finished P84.

The standard Nomex felt shows at the air to cloth ratio of 13.1 ft/min a 30 % lower filtration cycle time compared to the P84 felt (sample b) and higher differential pressure values though the p84 fabric weight is 4.4 oz/yd² lower.

VDI 3926 – Residual pressure drop of filter media after 1 additional cleaning

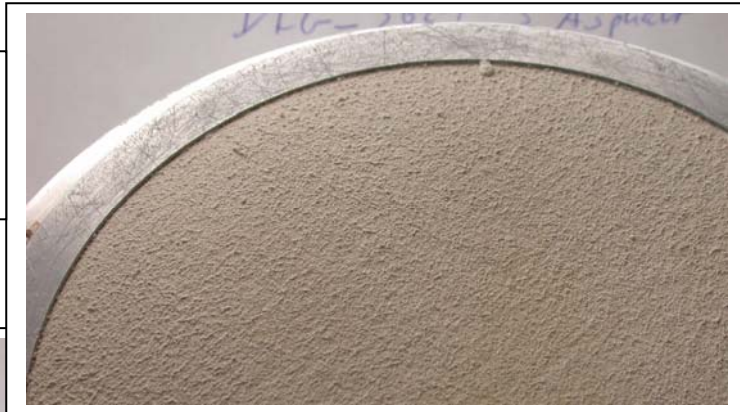


VDI 3926 – Clean gas concentration of filter media



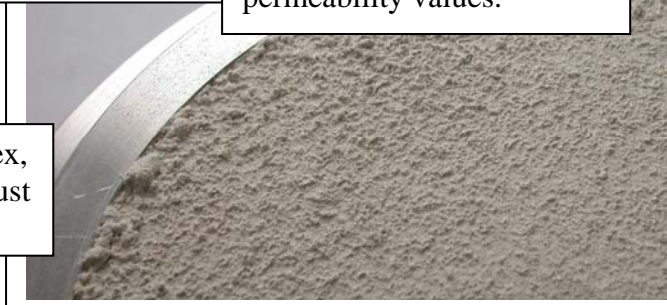
The photos of the round filter samples taken after the testing sequences show with sample b) an even and homogeneous surface whereas the calandered P84 and Nomex show an inhomogeneous surface because of patchy cleaning most probably caused by uneven distribution of air permeability values.

Sample b): P84 13.7 oz/yd², homogeneous distribution of the asphalt dust on the surface.



Sample a): P84 with silicone finish, calandered, 13.5 oz/yd², surface inhomogeneous, patchy cleaning because of uneven distribution of air permeability values.

Sample c): 100 % Nomex, scrimless 18.2 oz/yd², dust cake inhomogeneous



Summary

The P84 microfibre felt performs best under test conditions, exhibiting the lowest differential pressure drop and the longest cleaning cycle time in combination with a higher cleaning efficiency (clean gas dust content) than the Nomex felt.

The Nomex felt shows higher clean gas dust content and pressure drop than the P84 microfibre felt.

The calandered P84 felt achieves the best filtration efficiency (the lowest clean gas dust content). The densified felt surface and some patchy cleaning results in higher differential pressure drop and shorter cleaning cycle time than the other felts under test conditions.