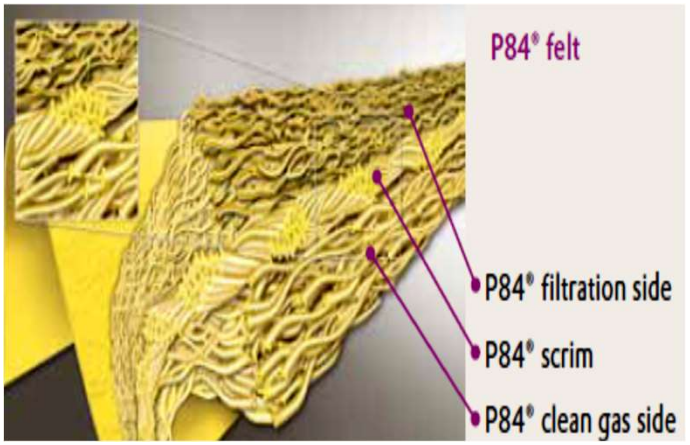
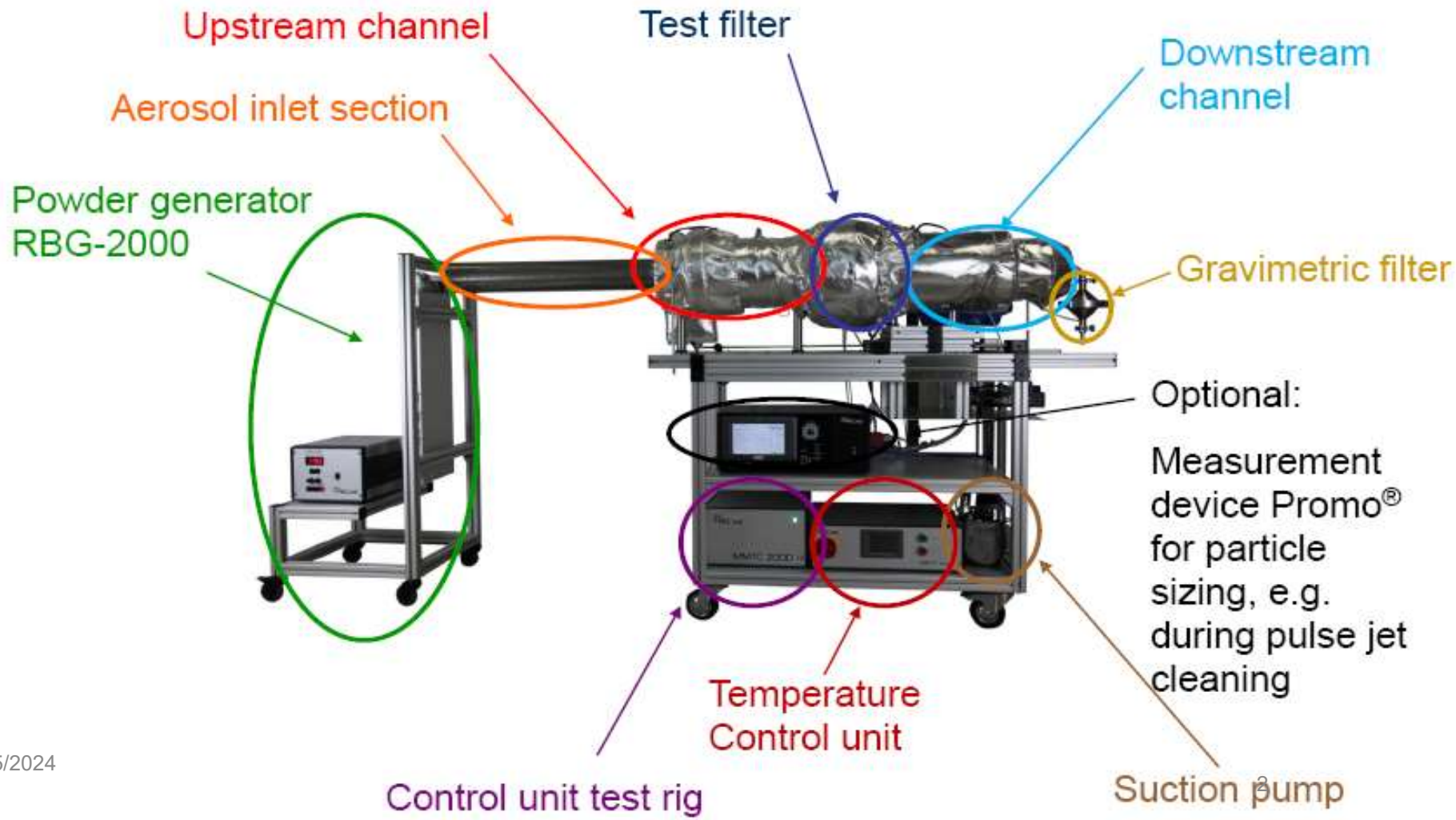
Case Study: Performance of media filter during hot gas filtration

Filter Media	Parameters	Levels
P84 + PTFE	Temperature (^{0}C)	4 (30^0,180^0, 200^0, 220^0)
	Dust Concentration (g/m^3)	2 (5, 90)
P84 + P84	Temperature (^{0}C)	4 (30^0, 160^0,180^0, 200^0)
	Dust Concentration (g/m^3)	2 (5, 90)



Test system MMTC-2000H



Operational Conditions and Test-Dust

Test conditions

- Face velocity: 2 m/min
- Pulse jet tank pressure: 5 bar
- Filter Area: 177 cm^2
- Cleaning pulse at 500 Pa differential pressure at the media

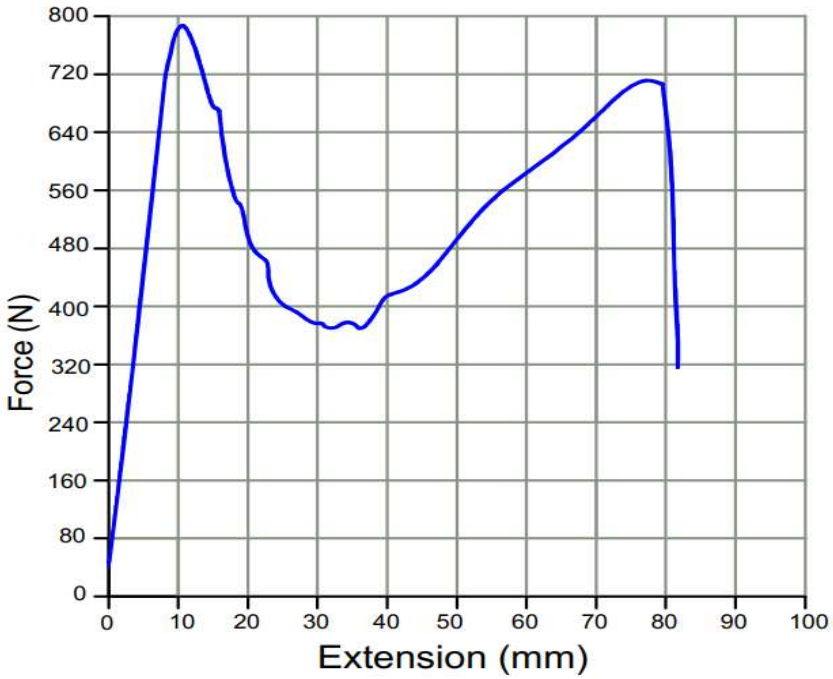
Test Dust

- Fly Ash (D_{10} = 1.39 µm, D_{50} = 3.27 µm and D_{90} = 5.88 µm)

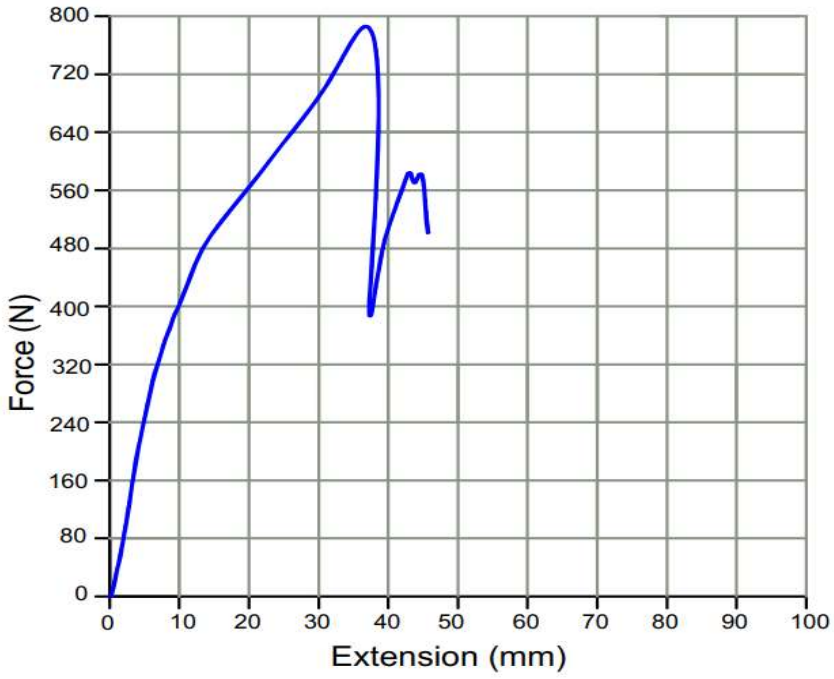
Test sequences

- **Conditioning:** Initial 5 cycles, cleaning pulse at 500 Pa
- **Ageing:** Ageing 45 min with a cleaning cycle at 5s
- **Measuring:** Final test of 1 hr. filtration and cleaning cycles with a cleaning pulse at 500 Pa

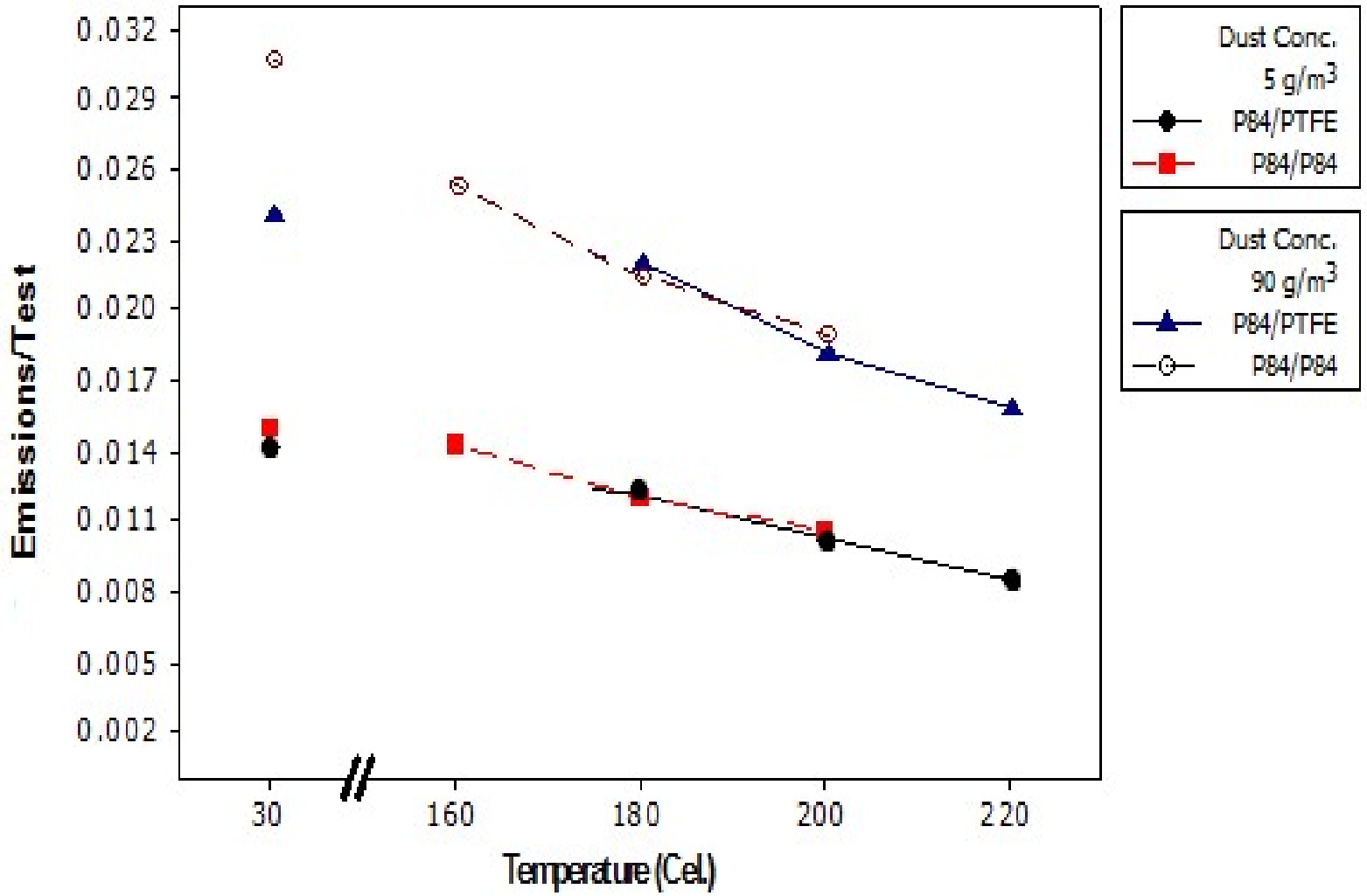
Tensile strength behaviour of filter fabric



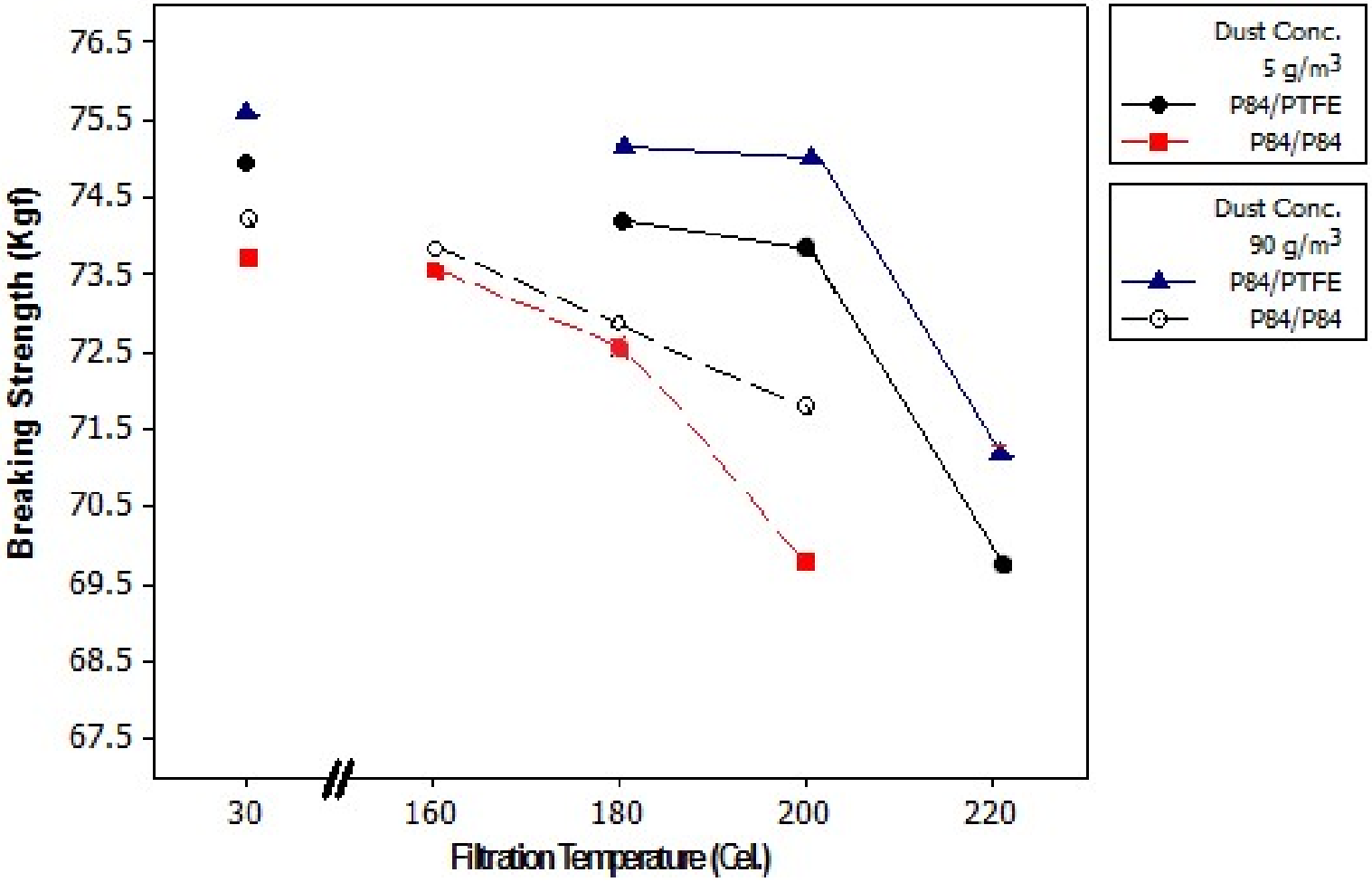
P84/PTFE



P84/P84



Plot for Temperature vs. Emissions

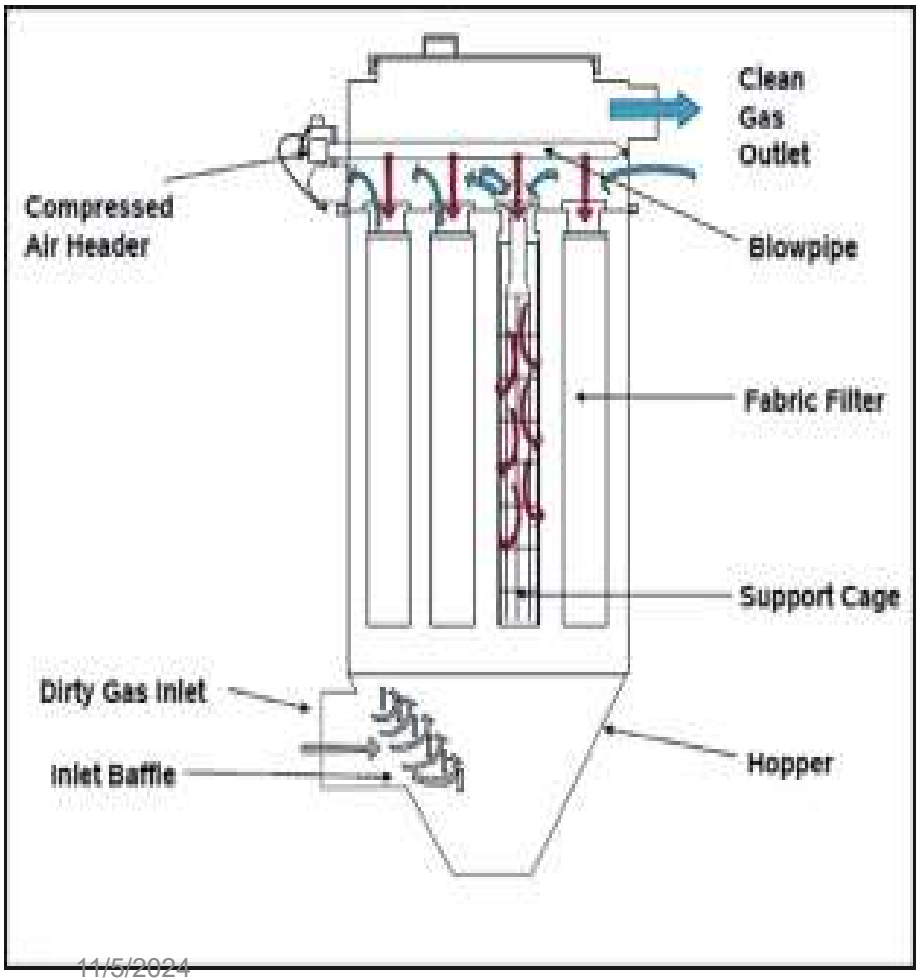


Plot for Temperature vs. Breaking Strength

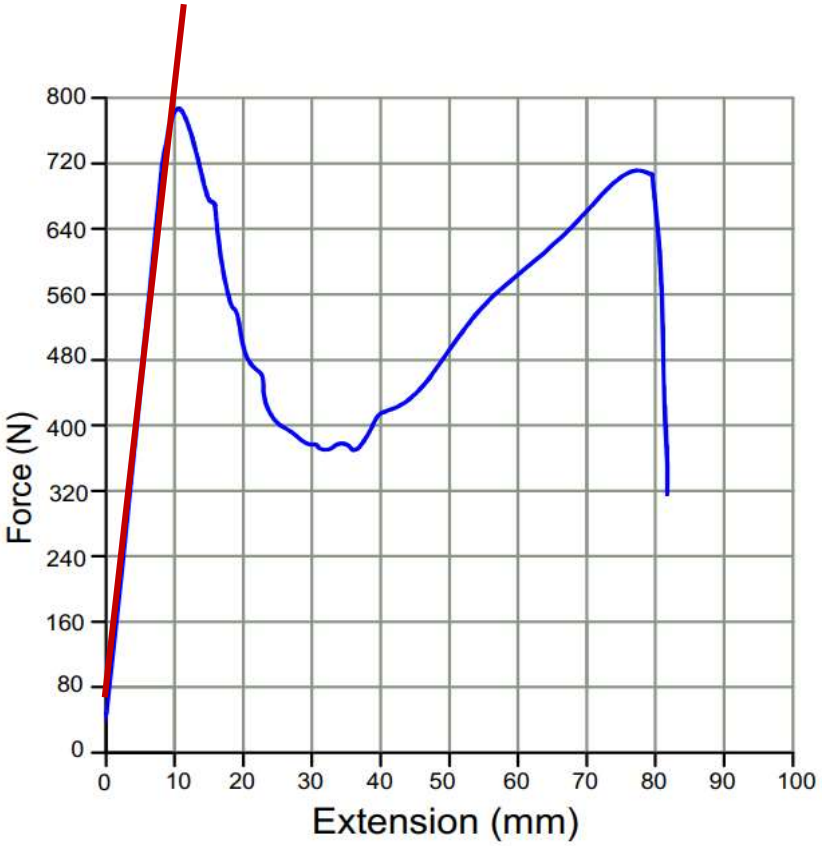
Material Performance at high temperature filtration

Physical Properties	P84 + P84 scrim	P84/PTFE scrim	Remarks on Filration performance
Area Weight	500 g/m^2	530 g/m^2	No direct connection can be established
Thickness	2.2 mm	2.4 mm	No direct connection can be established
Air Permeability	600 m^3/m^2h	570 m^3/m^2h	No impact
Tensile Strength	781 N	775 N	Governed by flexing of material; performance of P84/PTFE scrim is better than P84 + P84 scrim
Max. Continuous Temperature	200^0C	220^0C	
Smallest Pore Size (micron)	6.34	4.66	No direct connection can be established
Mean Pore Size	29.3	27.8	

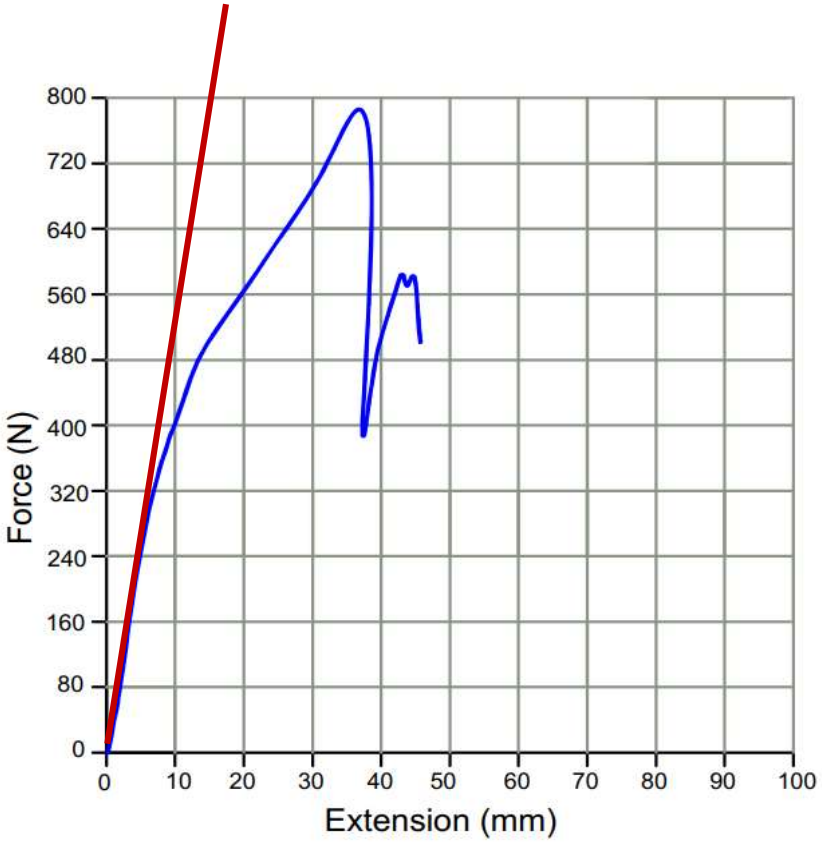
Damage of Filter Media



Tensile strength behaviour of filter fabric

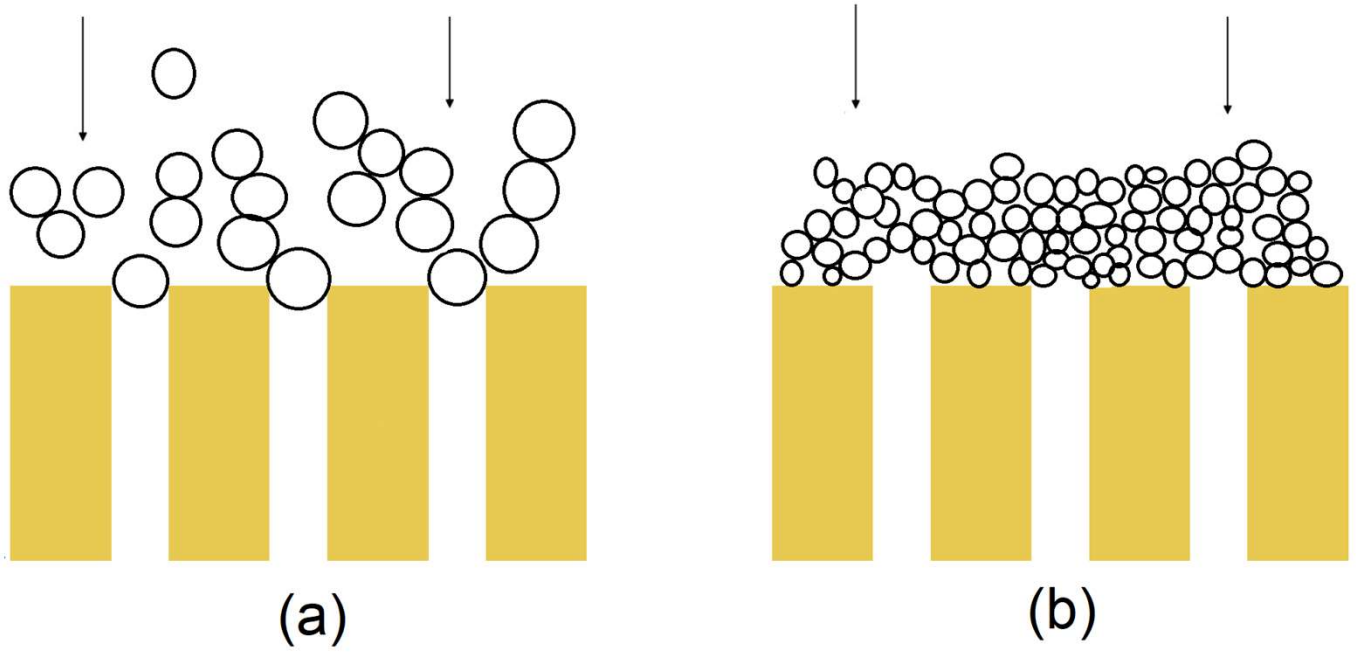


P84/PTFE



P84/P84

Pore sizes and shape is determined by fibre arrangement and its consolidation. The size of pores is usually large compared to the size of the particles filtered- unlike sieve or some membrane filter.



Mechanism of surface filtration. (a) Complete blocking filtration; (b) Bridging filtration