



Finetex EnE, Inc.



Where smaller fibers make a big difference!

Finetex Nanofiber

Dust Collector Filters

www.ftene.com

Fine Dust Crisis

Severity of Fine Dust Crisis in South Korea

26.5 $\mu\text{g}/\text{m}^3$

Annual average concentration of ultrafine dust (PM2.5)

Exceeds World Health Organization (WHO) limit of $10 \mu\text{g}/\text{m}^3$ by 2.65 times.
L.A. (USA): $17 \mu\text{g}/\text{m}^3$ | Paris (France): $15 \mu\text{g}/\text{m}^3$

(Source: 2015, Ministry of Environment)

48,400 people

Estimated deaths from 20 coal power plants currently in plan/construction, if operated for the next 40 years

Deaths from 53 currently operating coal power plants: **1,100 deaths / year**
Deaths from 20 newly planned/developing coal power plants: **1,020 deaths / year**

(Source: OECD 2016, Ministry of Environment)

10 Trillion Won

Economic cost related to Korea's air pollution and climate change

| | |
|----------------------------|------------|
| Greenhouse gas increase: | #1 in OECD |
| Overseas coal investments: | #2 in OECD |
| Coal imports: | #4 in OECD |
| Per person coal usage: | #5 in OECD |
| Greenhouse gas emission: | #7 in OECD |

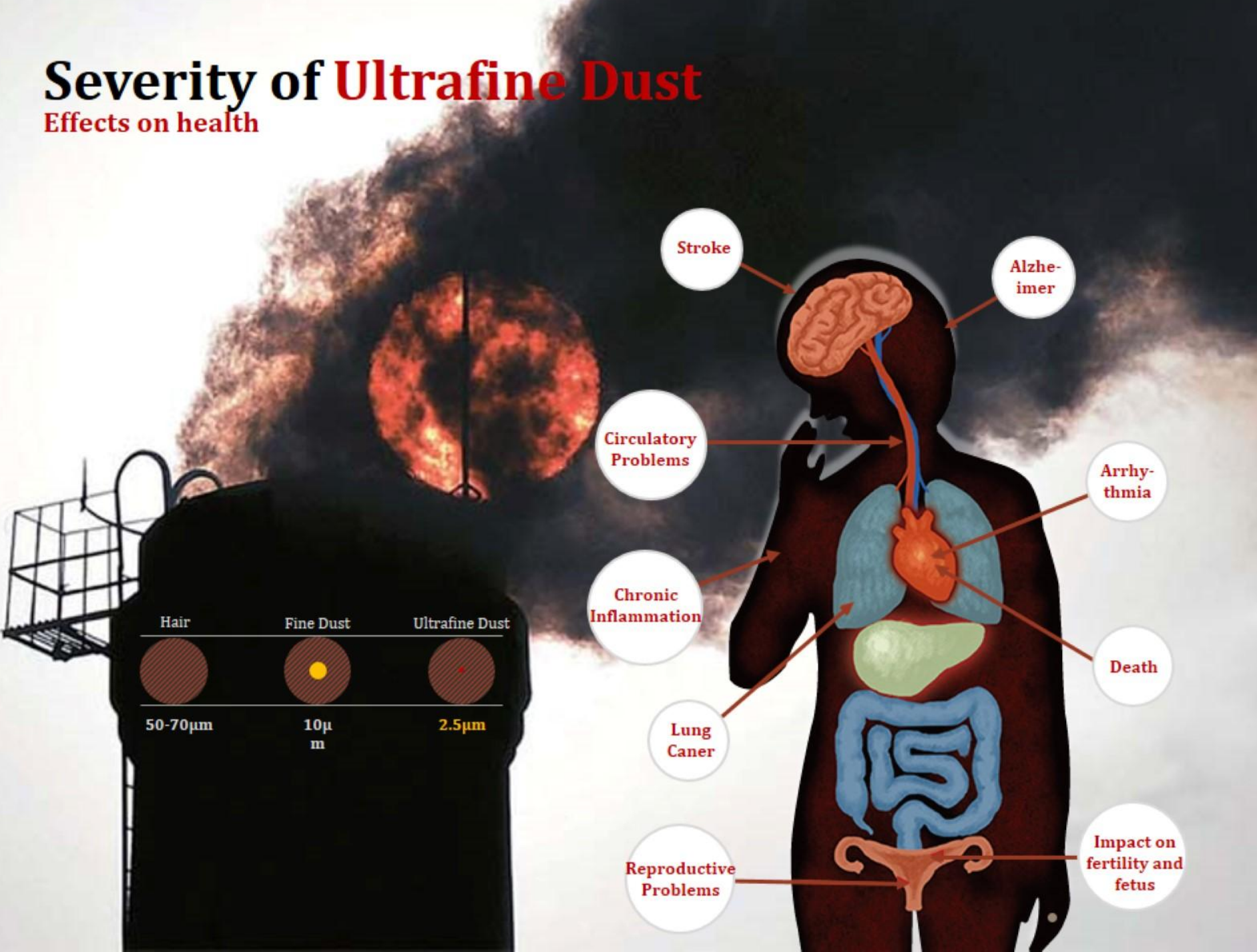
(Source: OECD 2016, Greenpeace)

Becoming a critical socio-economic issue

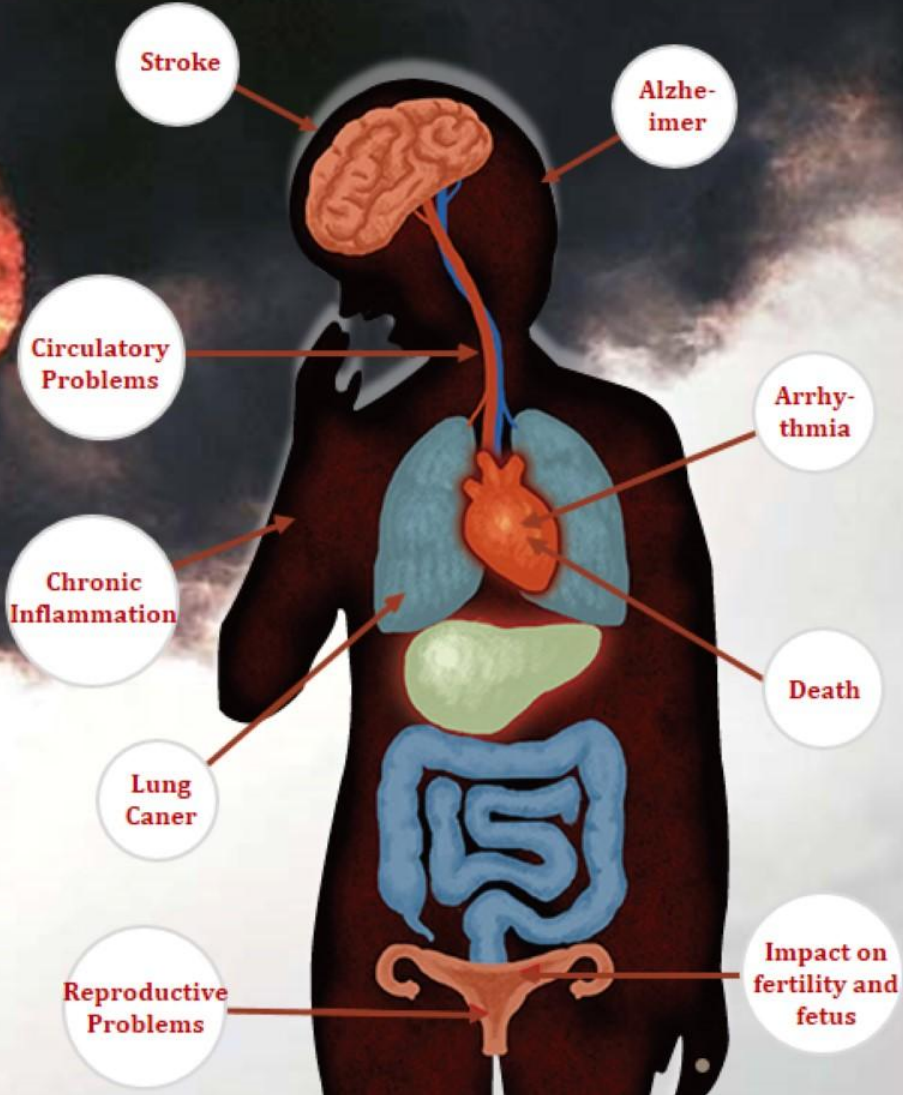


Severity of Ultrafine Dust

Effects on health



| Hair | Fine Dust | Ultrafine Dust |
|--|--|--|
|  |  |  |
| 50-70µm | 10µm | 2.5µm |



Dust Collector Summary

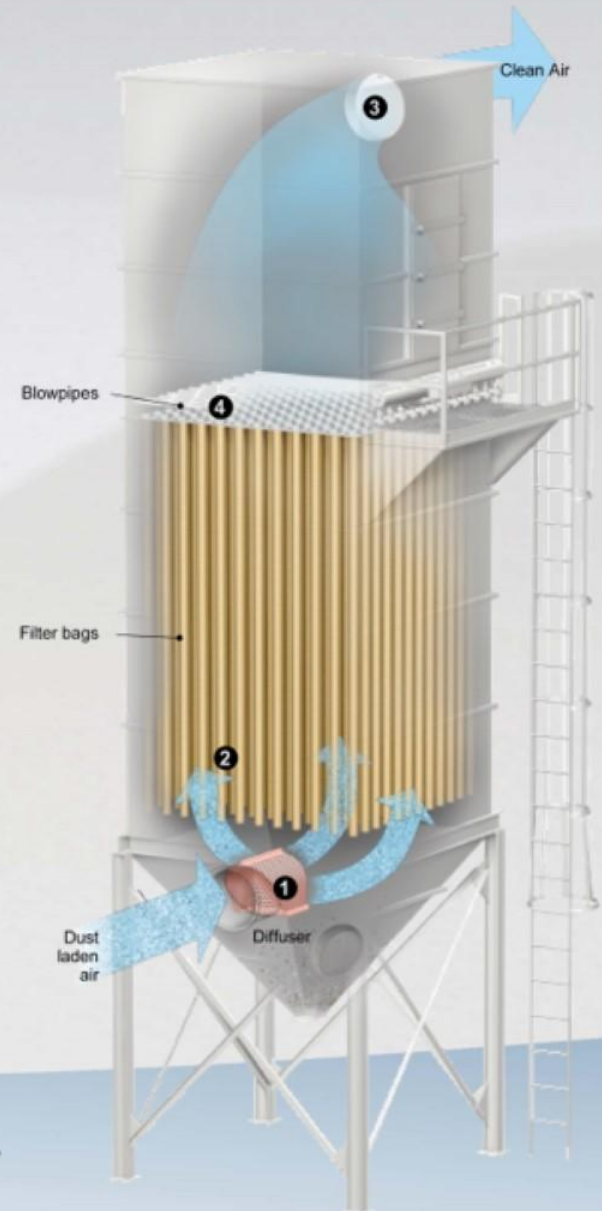
Dust collector prevents harmful dust particles from being released to the atmosphere by effectively filtering out coal dust and other industrial dust.

Application

Coal fire power plants | Steel manufacturing and casting
Cement plants | Chemical plants
Various dust and particle creating industries

Operation Method

- 1 Dust/particles created during manufacturing process is dispersed evenly to set of filters by the diffuser
- 2 Filtered air penetrates to inside the filter bags or pleated filters
- 3 The clean air by the filters are released to the atmosphere
- 4 The dust/particles captured on the surface of the filters are pulsed off from burst of high pressure air from the blowpipes, resulting in the dust/particles falling off and being collected in the hopper.



Nanofiber Filter versus Other Technology

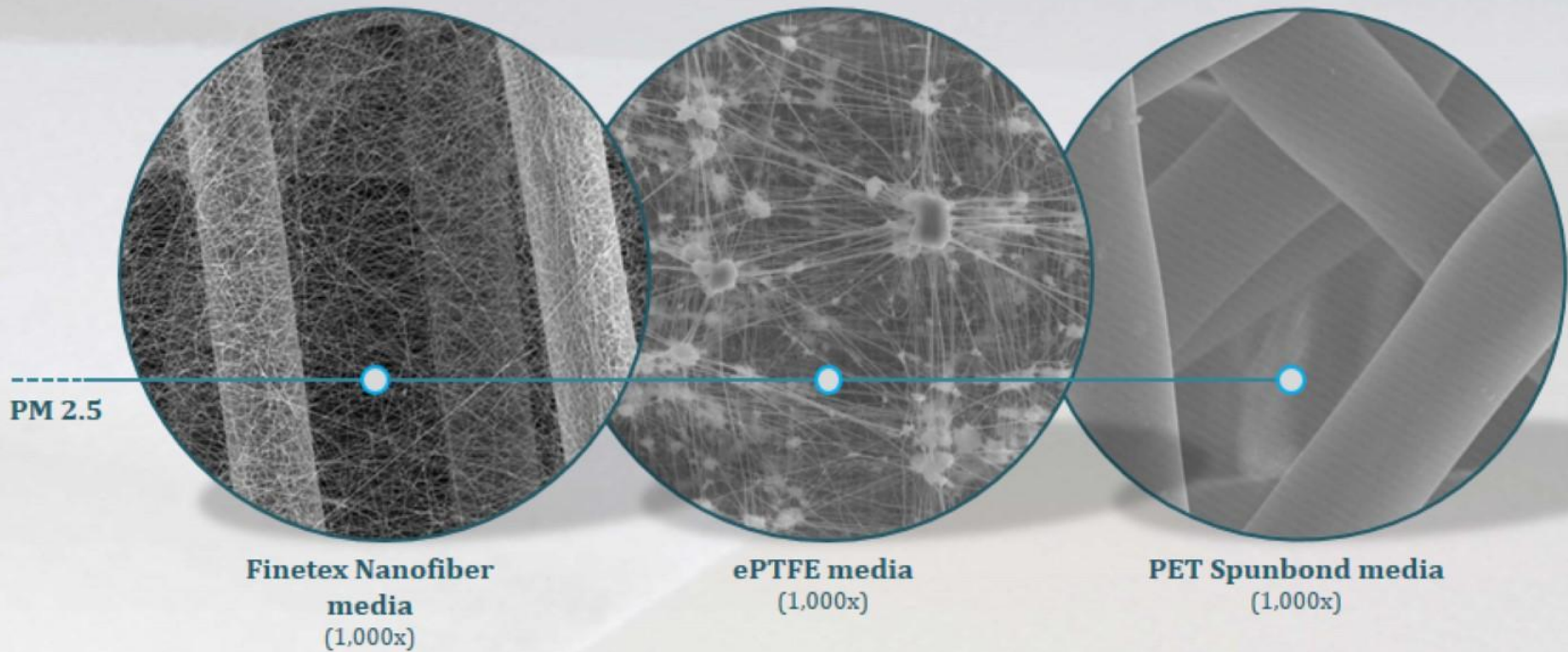
Filter media performance comparison

| | Standard PET Spunbond | ePTFE | Finetex Nanofiber | | |
|--|-----------------------|-------|-------------------|--------------------|--------------------------|
| Specification | | | | Unit | Standard |
| Basis Weight | 240 | 240 | 240 | g/m ² | BS ISO 536 TAPPI T410 |
| Air Permeability @ 125 Pa | 25.1 | 5.1 | 10.0 | cfm | ASTM D737-96(Frazier) |
| Pressure Drop @ 5.33cm/s, 32L/min | 6.4 | 28.8 | 14.4 | mmH ₂ O | ASTM D 2986 |
| Filtering Efficiency 0.3um @ 5.33cm/s | 37.2 | 98.6 | 98.0 | % | ASTM D 2986 |

- Standard PET Spunbond: Company T | ePTFE : Company K
- Available filter type : Pleatable filters, Bag filters

Nanofiber Filter versus Other Technology

SEM Images

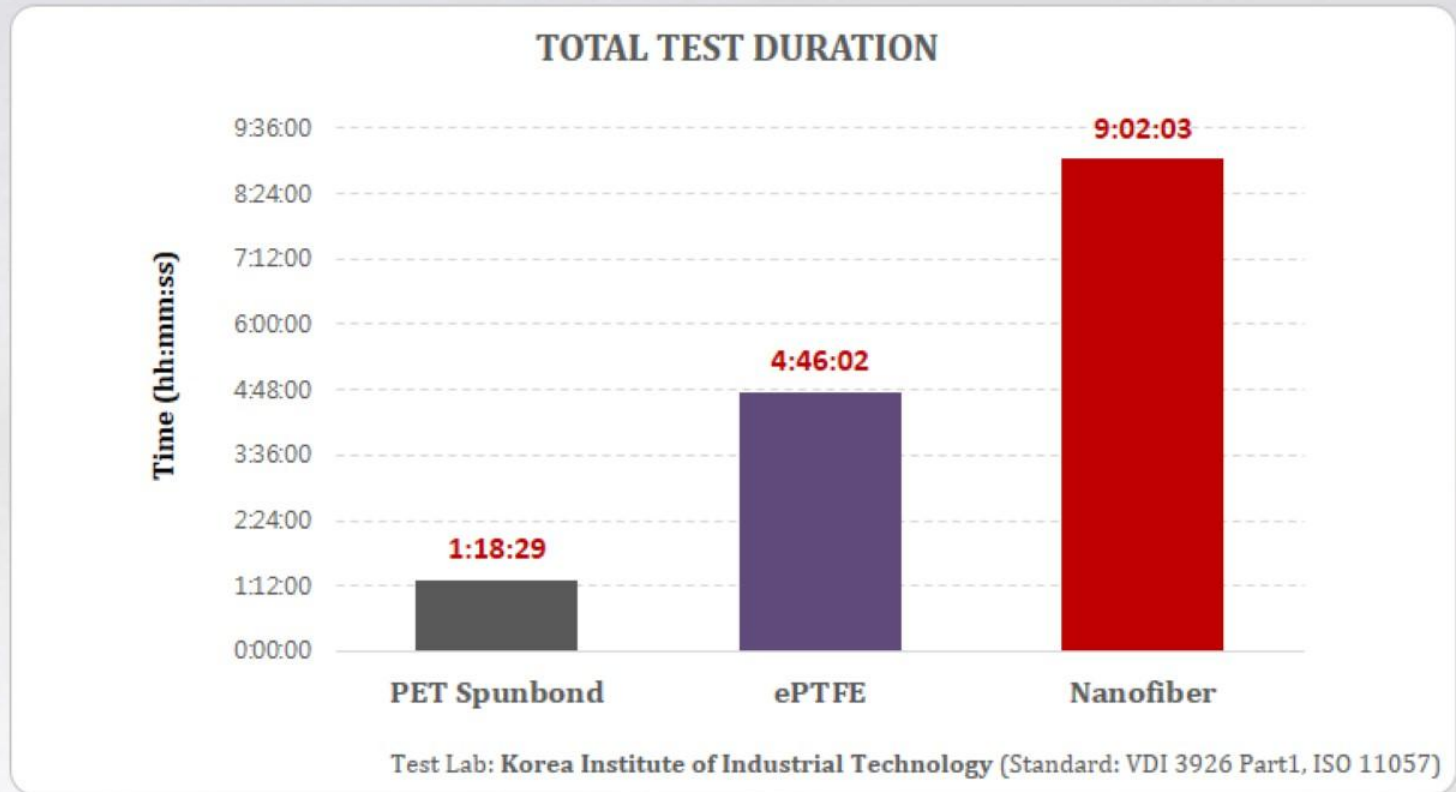


| Product (Efficiency at different particle size) | 3-10 μm | 1-3 μm | 0.3-1 μm |
|---|--------------------|-------------------|---------------------|
| Standard PET Spunbond | ● | ● | ● |
| Standard ePTFE | ● | ● | ● |
| Finetex Nanofiber | ● | ● | ● |

● EXCELLENT ● FAIR ● POOR

Nanofiber Filter versus Other Technology

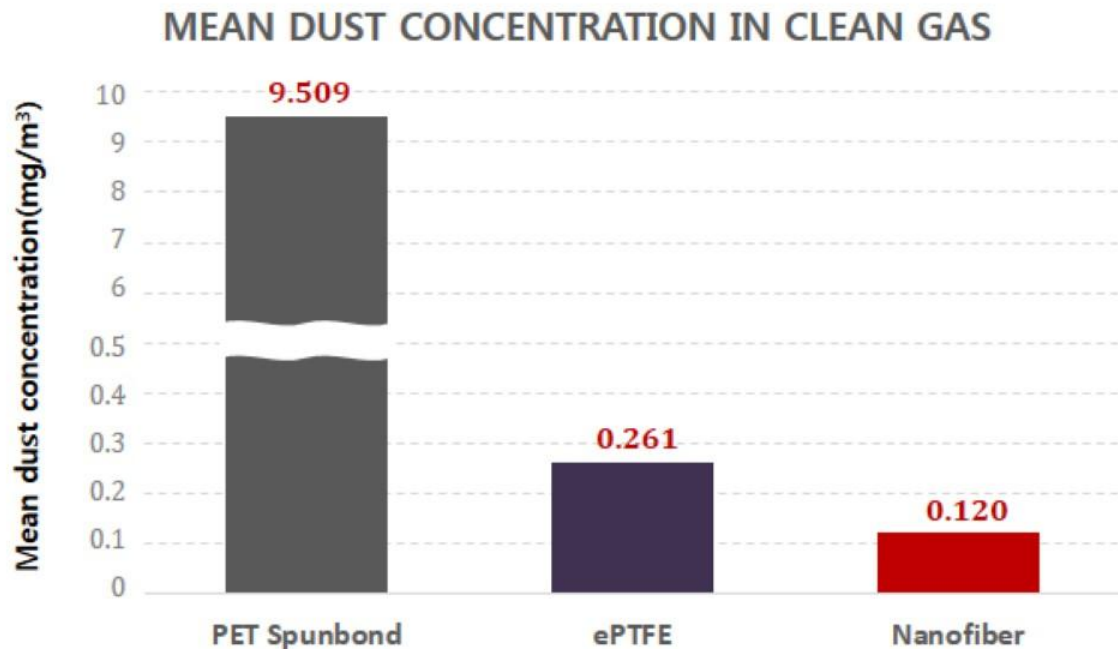
Life Cycle (400Pa, 100 Cycles)



- **6.9x** longer life versus standard PET spunbond and **1.9x** times longer than standard ePTFE

Nanofiber Filter versus Other Technology

Mean Dust Concentration - 400Pa, 100 Cycles



Test Lab: Korea Institute of Industrial Technology (Standard: VDI 3926 Part1, ISO 11057)

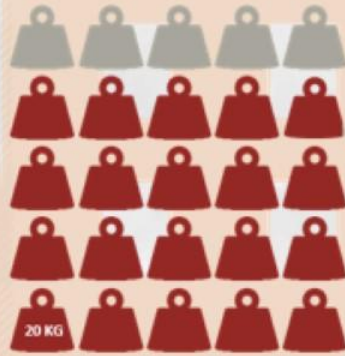
- **1/80x** lower dust concentration versus standard PET spunbond and **1/2x** versus standard ePTFE
- Majority of filtered particles are **smaller than 2.5µm ultrafine dust**.
- For raw material recovery system, it can recover 80x more than PET Spunbond and 2x more than standard ePTFE

Nanofiber Filter versus Other Technology

Annual cumulative dust emission amount - 1 Dust Collector, 1,000 Filters

15,398 KG

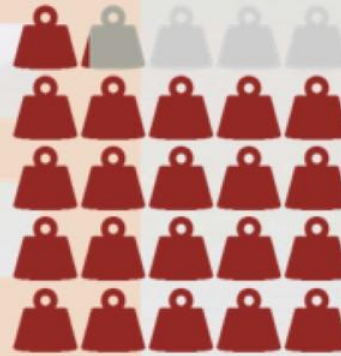
61.6 kg/day



Standard PET Spunbond

423 KG

1.69 kg/day



Standard ePTFE

194 KG

0.78 kg/day

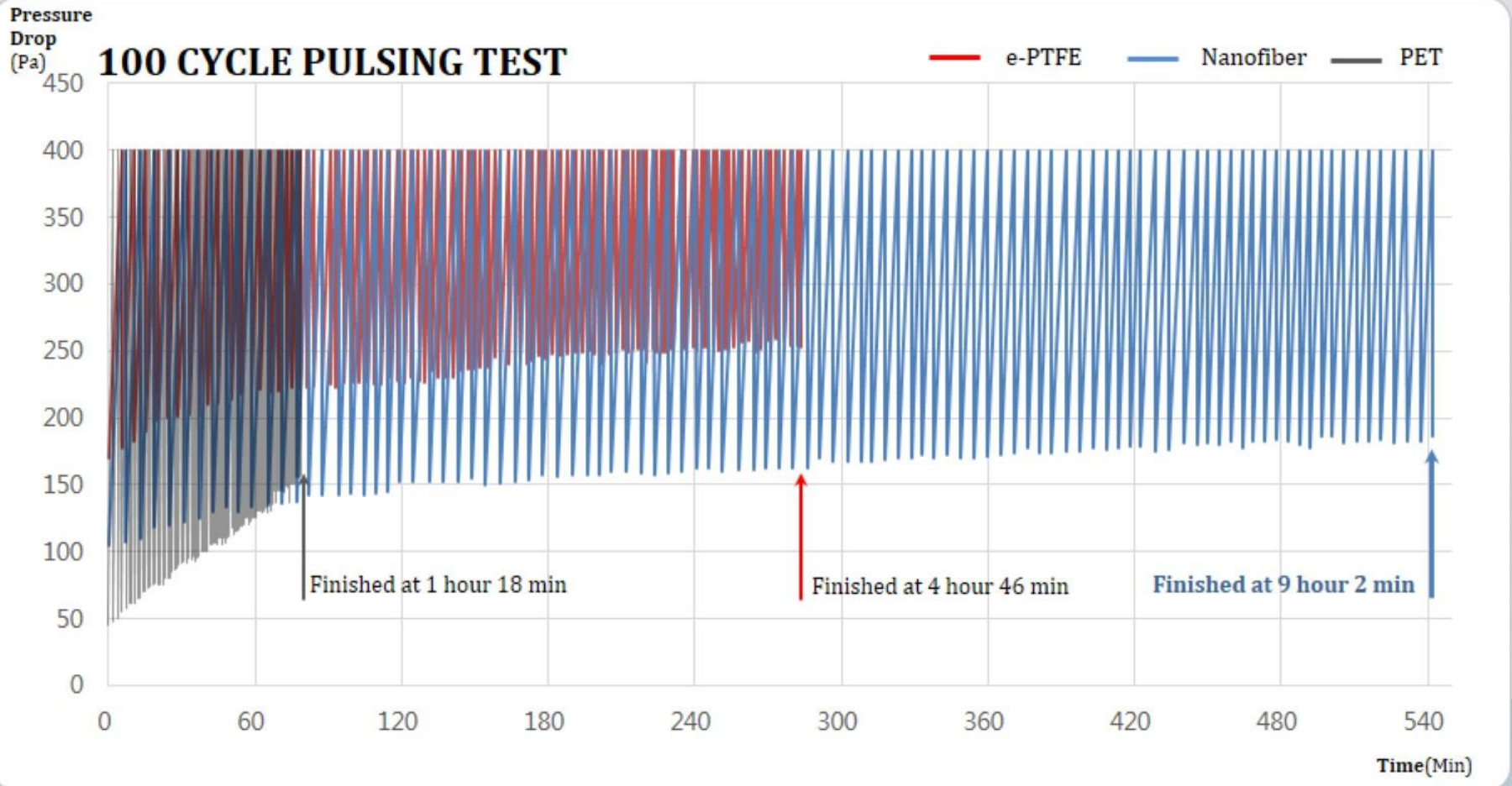


Finetex Nanofiber

* Flux rate of 4,500m³/min, 1 year, 6,000 hour operation

Nanofiber Filter versus Other Technology

Filter pulse cleaning test – Measurement of duration and pressure drop for 100 cycles



Nanofiber Filter versus Other Technology

Comparison Summary

| | Standard PET Spunbond | ePTFE | Finetex Nanofiber | | |
|--------------------------------|-----------------------|----------|-------------------|----------|--------------------------------|
| Specification | | | | Unit | Standard |
| Total test duration @100 Cycle | 01:18:29 | 04:46:02 | 09:02:03 | hh:mm:ss | |
| Average duration per cycle | 47 | 170 | 325 | sec | VDI3926 Part 1 ISO 11057 |
| Average dust emission rate | 9.509 | 0.261 | 0.120 | mg/m3 | |

Test Lab : Korea Institute of Industrial Technology

Cost Reduction from Nanofiber Filters

Annual electricity cost per filter type – System fan and compressor electricity usage per 1000 filters

| Type | System Fan | Compressor | Total | Remarks (Unit: dollar) |
|--------------------------|---------------|------------|---------------|---------------------------|
| | | | | |
| Finetex Nanofiber | 25,060 | 395 | 25,455 | |
| Standard ePTFE | 50,120 | 746 | 50,866 | + 25,411 |
| Standard PET Spunbond | 75,180 | 4,578 | 79,758 | + 54,303 |

* Actual cost may differ from the calculation method

Cost Reduction from Nanofiber Filter

Cost of filter replacement – based on 30 month usage for 1,000 filters

| Item | Specification | PET Spunbond | Domestic ePTFE | Finetex Nanofiber |
|---|--|----------------|----------------|-------------------|
| Filter Cost | | 30 | 80 | 80 |
| Filter Life | Months | 6 | 12 | 24 |
| Replacement Frequency | Per 30 months | 5 | 2.5 | 1.25 |
| Total Filter Purchase Cost | | 150,000 | 200,000 | 100,000 |
| Disposal Cost | Industrial Waste \$ 65 /m ² | 16,640 | 8,320 | 4,990 |
| Replacement Cost (3 rd party service) | Average \$ 8/Filter | 40,000 | 20,000 | 12,000 |
| Total | | 206,640 | 228,320 | 117,000 |

(Unit: dollar)

| | | | |
|-----------------------|---------------|----------------|----------|
| Cost Reduction | 89,640 | 111,330 | - |
|-----------------------|---------------|----------------|----------|

* Actual cost may differ from the calculation method

Finetex Nanofiber Filter Advantages



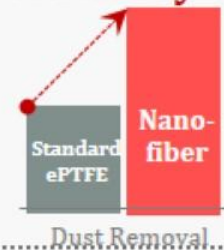
- **Highly efficient against ultrafine dust**

99.999%



- **Improvement in particulate efficiency**

2.0x



- **Increase in filter life**



- **Reduction in operation cost**

Compared to standard ePTFE



Test Report

Test Report

Testing Criteria

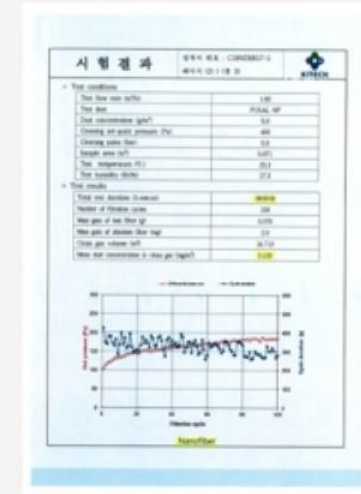
- Filter Life
- Filter Efficiency
- Filter Dust Emission



Standard PET Spunbod



Standard ePTFE



Finetex Nanofiber

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