

Abstract

- ❖ Main focus: fine dust collection in Metro subway air handling unit
- ❖ Idea: normal filtration in ordinary days, but double filtration when harsh dust flows in
- ❖ Material: electrically charged filter fiber for low pressure drop and high collection efficiency
- ❖ Result: efficiency increase - 20~30% for PM2.5 and PM10, additional pressure drop - 25%.

> Acknowledgement

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Method and experiment

◆ Experimental condition

- * Test filter area: Rectangular 4cm x 4cm * Filtration velocity: 0.5 ~ 2.5m/s
- * Test dust: Arizona dust (ISO, A1 ultrafine) * Feed dust conc.: C = 300~600 mg/m³
- * Operation time: 2 hours

- ❖ Used electret filters: thin fiber bundle filter from Fresh, Sweden and flat plate and/or pleated filters from EGIS, Korea.
- ❖ Figure 1 : a schematic set-up for lab test
- ❖ Current field filter examination: from March to June

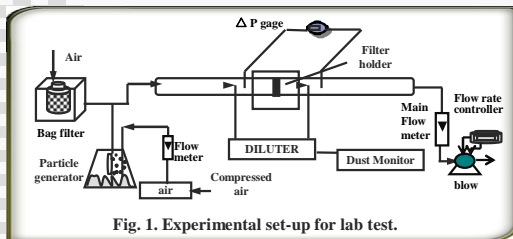


Fig. 1. Experimental set-up for lab test.

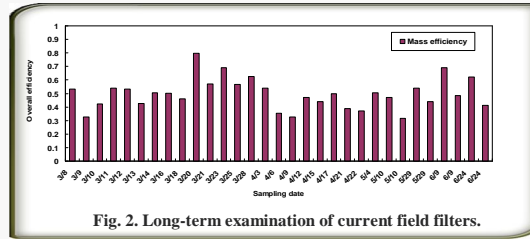
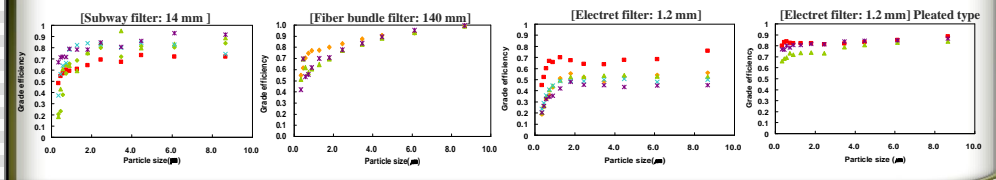


Fig. 2. Long-term examination of current field filters.

> Grade efficiency

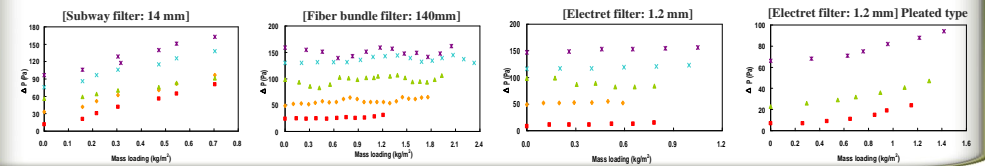


Title: Fine dust collection by double-staged filtration system in a subway – air handling unit

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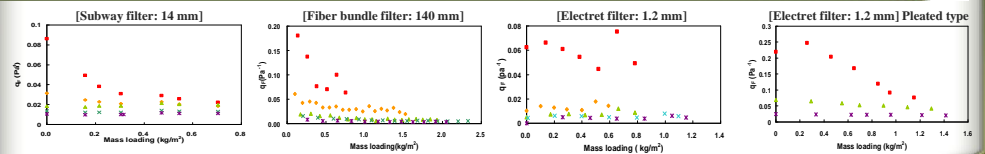
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> Pressure drop with dust loading

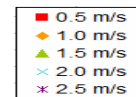


> Filter quality

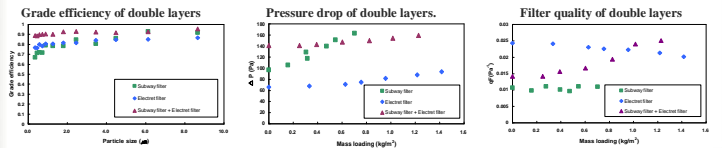
$$q_f = \frac{\ln(1/P)}{\Delta P} \quad P: \text{penetration rate of the dust}$$



<Filtration velocity>



> Field test of pleated filter



Conclusions

- ❖ Grade efficiency: Electret filter(Pleated type) > Subway filter, Fiber bundle filter > Electret filter
- ❖ Serial arrangement of filters: improve fine dust collection particularly under harsh air outside
- ❖ Additional pressure resistance must be controlled by auto-controlled operation.

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