

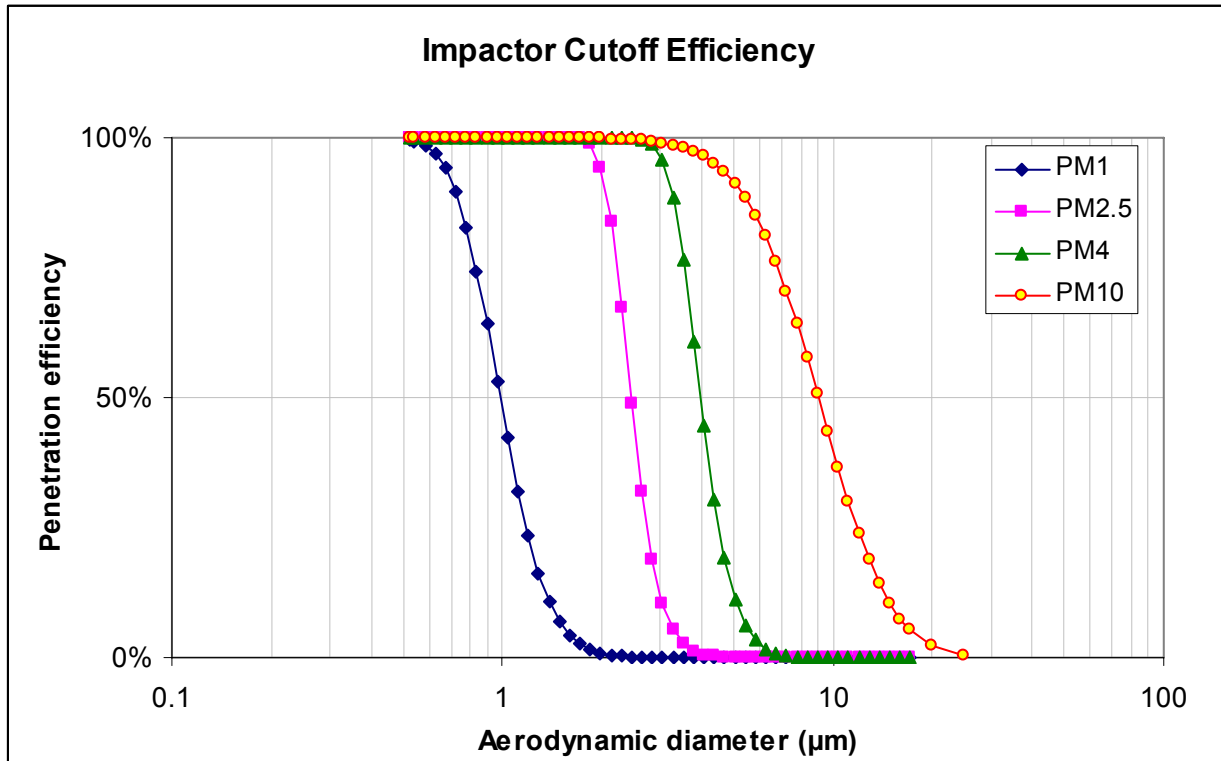
DUSTTRAK™ II Aerosol Monitor and DUSTTRAK™ DRX Aerosol Monitor Impactor Penetration Efficiency Curves

Application Note EXPMN-003

All Models of DUSTTRAK™ II and DRX Aerosol Monitors are designed to accept impactors (size-selective inlets) to attain specific mass fractions of the sampled aerosol. TSI designed four impactors (PM_1 , $PM_{2.5}$, PM_4 , and PM_{10}), which are included in the DUSTTRAK II accessory kit. The $PM_{2.5}$ impactor is used for calibration of the desktop and handheld models of the DUSTTRAK DRX Aerosol Monitors. All TSI impactors are designed to provide the specified cut size at a constant flow rate of 3.0 L/min. They are single-stage impactors which use a collection plate made of sintered metal soaked with vacuum pump oil. This feature significantly reduces particle bounce and allows the impactors to function well at high mass concentrations. Vacuum oil is also preferred over vacuum grease or any other more viscous material since the greased plate will last only a short time before particle bounce starts to impair impactor performance.

Oil has much lower viscosity than the grease. It will wet the deposited particle due to capillary effect. Therefore, even after the plate is coated with particles, the incoming particle will still contact a wet surface, which significantly reduces particle bounce. The oil saturated sintered impaction plate allows much larger particle mass loading and longer sampling time than the greased regular impaction plate.

The performance of the impactors was characterized using Arizona Test Dust (or ISO 12103-1, A1 test Dust) along with a TSI Aerodynamic Particle Sizer APS Model 3321. The Arizona Road Dust is aerosolized using the TSI Fluidized Bed Aerosol Generator Model 3400A. The impactor penetration efficiency curves are shown below. Note that the $PM_{2.5}$ and PM_{10} impactors penetration curves agree very closely with the EPA sampling conventions. However, the PM_4 impactor cutoff curve is sharper than occupational respirable sampling conventions.



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