

**S1.2.3 FRACTIONAL EFFICIENCY MEASUREMENTS WITH REGARD TO PM 10,  
PM 2.5, PM 1 AND ISO 16890**  
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Optical scattered light measurement at the single particle to determine fractional separation efficiency is general state-of-the-art technology in filter testing. The measuring devices deployed for the respective application are defined in ISO 21501 Part 1 or for clean room application in ISO 21501 Part 4. Aerosol spectrometers are characterized by high resolution and high classification accuracy and in high concentration. They are therefore preferentially used for ambient air monitoring and for the determination of fractional separation efficiency in the relevant applications for testing ambient air filters, vehicle filters, engine air filters, compressed air filters and vacuum cleaners. In ambient air filter testing in accordance with the new ISO 16890, the evaluation of fractional separation efficiency is based on conversion of measurements with PM values from an aerosol spectrometer.

The PM 1, PM 2.5, PM 4 and PM 10 values are based on investigations of particle size, dependent deposition of particles in the human airways. The respective PM value is determined gravimetrically, i.e. mass-related, taking into account the defined separation efficiency curve.

Therefore, particles up to approx. 16 µm have to be considered in determining the PM 10 value. For the optical measurement methods, this means that the particle size has to be precisely determined with the respective aerosol spectrometer, in order to convert the measured particle diameter to the measured particle volume and thus to the particle mass.

With the Fidas® System, Palas® offers the only optical aerosol spectrometer certified in accordance with EN 12341:1998 and EN 14907:2005 for PM 2.5 and PM 10 measurements. The Palas® aerosol spectrometers *welas®* digital and *Promo®*, which have proven themselves internationally in filter testing, are almost the same in their design as the certified Fidas® system and therefore provide reliable PM values in filter testing.

This presentation outlines the procedures for determining PM values with the optical aerosol spectrometers Fidas® and Promo® and compares the measurement results from fractional separation efficiencies and PM separation efficiencies.