Air filter testing under overpressure up to 10 bar and isobaric conditions in accordance with ISO 12500

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For the determination of the fractional separation efficiency, which means the determination of the separation efficiency in dependence on the particle size, a particle counting and particle size measuring device, a so-called optical aerosol spectrometer, is generally used in several national and international standards.

Such a device is also recommended in the two existing ISO standards in the field of testing compressed air filters:

ISO 8573-1 to 9	Describes test methods for the classification of the compressed air quality on site
ISO 12500-1 to 4	Filters for compressed air – Test methods

In those standards the testing under pressure up to 7 bar is a requirement for the characterisation of the compressed air filters.

Normally the particles of an aerosol are in the thermodynamic equilibrium with the carrier gas. If the thermodynamic conditions change, e.g. the temperature or the pressure, the aerosol maybe changes its particle size and particle concentration. Those changes can occure by condensation, agglomeration or evaporation of the particles.

If the aerosol is released from overpressure to ambient conditions, it is necessary to prove that there will be no change of the particle size distribution and particle concentration of the aerosol. It also has to be proved that there will be no difference between up- and downstream sampling point and sampling lines.

In the case of pressurised air filter testing in accordance with the above mentioned standards it is to be particularly made certain that the complete measuring chain is laid out isobaric to avoid changes of the aerosol.

Within isobaric measurements the sampling tube, a possibly needed dilution system, as well as the measuring instrument must be operated under the same pressure conditions as the measured aerosol.

In the following paper we will mainly focus on the ISO 12500. We will show a test set-up which was realised to test the fractional efficiency of compressed air filters isobaric at up to 10 bar overpressure. (Figure 1)

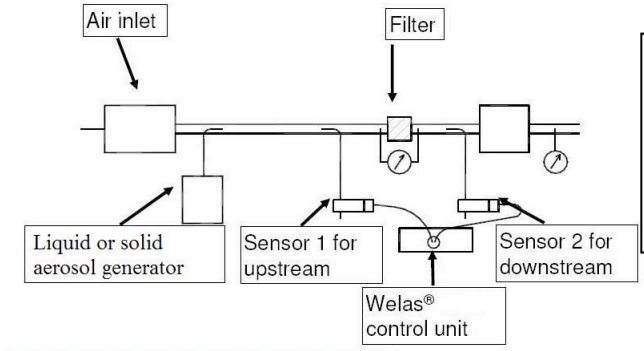

Figure 1:
Test set-up for isobaric measurements of compressed air filters at an overpressure of up to 10 bar

We will show measurement results in accordance with ISO 12500-1 Oil Aerosol Removal (Figure 2). Those measurements can be done up to an overpressure of up to 10 bar.

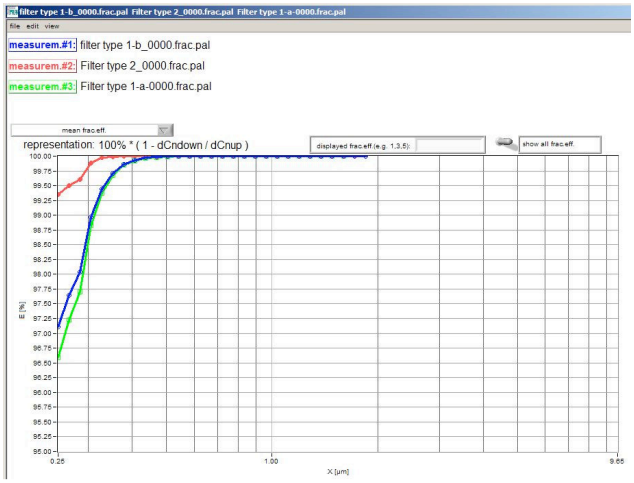

Figure 2:
Comparison of the fractional efficiency of three compressed air filters under 5 bar overpressure

Displayed scale 95 - 100 % of fractional efficiency

We will also inform how to test compressed air filters isobaric in accordance with ISO 12500-3 Particulate Removal. Those measurements can be done up to an overpressure of 3 bar.

The instruments described in the paper (pressure tight aerosol generators for liquid and solid particles and the isothermal and isobaric aerosol spectrometer welas® system) will give the user a very powerful device to develop and to compare compressed air filters in accordance with ISO 12500-1 and ISO 12500-3 very fast and thus economically.

The main advantage for the user is the very good classification accuracy and the very good size resolution of the isothermal and isobaric measurement device welas® system according to ISO/FDIS 21501-1 (Aerosol Spectrometer).