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air quality monitoring

Protective Filter

passam info

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Introduction

The protective filter increases the measuring accuracy of the passive sampler. It reduces the influence of external conditions on the measurement result, e.g. wind influence on the sampling rate, contamination by dust or insect infestation. The protective filter is recommended for all passive samplers of the tube-type, i.e. NO_2 (SP01), NO_X (SP12) as well as NO_X-Set (SP12-S).

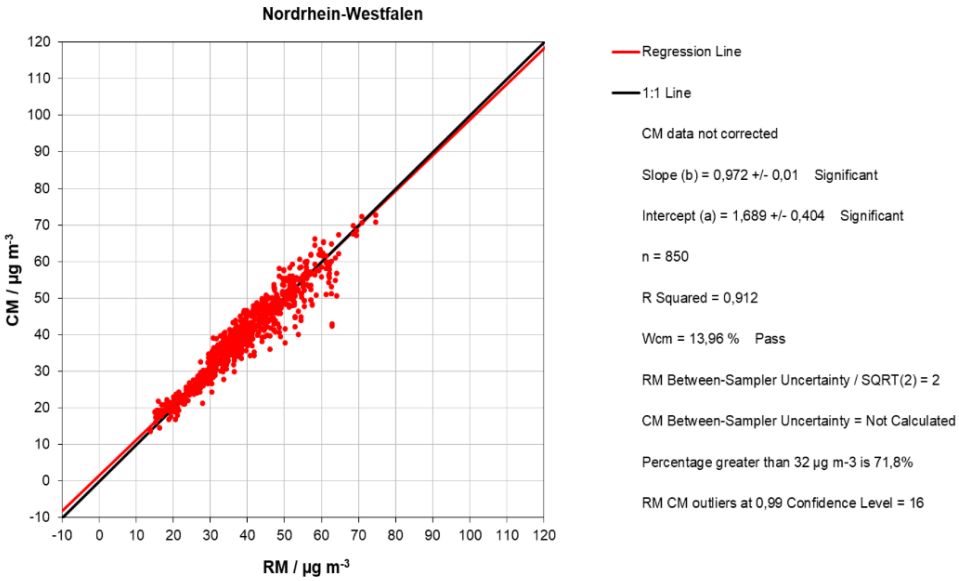
The protective filter is applied to the sampler during sampling and can be reused after proper cleaning (see paragraph "Cleaning"). Note that using the protective filter changes the sampling rate compared to sampling without it.

Demonstration of equivalence with the reference method

Due to the improved measurement accuracy when using a protective filter, the LANUV in Germany was able to demonstrate the equivalence of the NO_2 passive sampler with the reference method (chemiluminescence; EN 14211) [1]. Monthly measurements show a deviation of < 15% as shown in the figure. Annual mean values determined by means of passive samplers show an even smaller deviation of approx. 9%. These data are taken from the LANUV technical report [2].

Conclusion:

Nitrogen dioxide measurements with the tube-type passive sampler using the protective filter thus fulfil the EU criteria for fixed measurements with a measurement uncertainty < 15%.



Cleaning

In use, the protective filter becomes contaminated by dust. Intact but dirty filters can be reused for up to 2 years if cleaned regularly.

If the protective filter is cracked or otherwise damaged, it should be replaced immediately.

Without cleaning, the filters should be used for a maximum of 2 months at measurement locations close to traffic. The clogging of the protective filter depends on the surrounding dust load and can vary depending on the measurement location.

Cleaning protocol:

- Clean in an ultrasonic bath with deionised water for 5 min (no detergent added).
- Replace the deionised water and repeat cleaning in the ultrasonic bath twice.
- Dry well (e.g. in the oven at max. 40°C/12h)

Specifications

Designation:	protective filter, LANUV membrane, frit or turbulence barrier
Function:	**increases measuring accuracy**
Period of use:	with cleaning: up to 2 years
	without cleaning: up to 2 months (depending on dust load)
Recommended for:	NO_2 (SP01), NO_X (SP12) as well as NO_X-Set (SP12-S)
Material:	borosilicate glass filter

References

[1] Pfeffer, U., Zang, T., Rumpf, E.-M., & Zang, S. Calibration of diffusive samplers for nitrogen dioxide using the referencemethod – Evaluation of measurement uncertainty; *Gefahrstoffe - Reinhaltung der Luft*, 70,11/12, 500-506, 2010.

[2] Zang, Thorsten (2021) Messen von Stickstoffdioxid in der Außenluft: Nachweis der Gleichwertigkeit von Passivsammlern. Landesamt für Natur, Umwelt und Verbraucherschutz NRW. Recklinghausen (LANUV-Fachbericht, 108).