

AQUILA view on the new AQ pollutants in the new Directive



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Measurements at monitoring supersites

ANNEX VII

MEASUREMENTS AT MONITORING SUPERSITES AND OF MASS CONCENTRATION, CHEMICAL COMPOSITION OF PM_{2.5}, OZONE PRECURSOR SUBSTANCES AND ULTRAFINE PARTICLES

SECTION 1 – MEASUREMENTS OF POLLUTANTS AT MONITORING SUPERSITES

Measurements at all monitoring supersites at urban background locations and rural background locations shall include the pollutants listed in Tables 1 and 2 respectively.

Table 1 - Pollutants to be measured at monitoring supersites at urban background locations

Pollutant	Type of measurement
PM ₁₀ , PM _{2.5} , UFP, BC	Fixed measurements
NO ₂ , O ₃	Fixed measurements
SO ₂ , CO	Fixed or indicative measurements
Size distribution of UFP	Fixed or indicative measurements
Benzo(a)pyrene, other polycyclic aromatic hydrocarbons (PAH) as relevant ⁽¹⁾	Fixed or indicative measurements
Total deposition ⁽²⁾ of benzo(a)pyrene, and other polycyclic aromatic hydrocarbons (PAH) as relevant	Fixed or indicative measurements
Arsenic, cadmium, lead, and nickel	Fixed or indicative measurements
Total deposition ⁽²⁾ of arsenic, cadmium, lead, nickel and mercury	Fixed or indicative measurements
Benzene	Fixed or indicative measurements
Chemical composition of PM _{2.5} in accordance with Section 1 of Annex VII	Fixed or indicative measurements

¹ Benzo(a)pyrene and the other polycyclic aromatic hydrocarbons referred to in Article 9(8).

² Where the siting of a monitoring supersite at an urban background location does not allow for the guidelines and criteria of EMEP to apply in accordance with Point C, point (f), of Annex IV, the corresponding deposition measurement may be performed at a separate urban background location within the area of representativeness.

New: UFP, PNSD, BC, NH₃, oxidative potential, levoglucosan, mercury, nitric acid.

Table 2 - Pollutants to be measured at monitoring supersites at rural background locations

Pollutant	Type of measurement
PM ₁₀ , PM _{2.5} , UFP, BC	Fixed measurements
NO ₂ , O ₃ and ammonia (NH ₃)	Fixed measurements
SO ₂ , CO	Fixed or indicative measurements
Total deposition of benzo(a)pyrene and other polycyclic aromatic hydrocarbons (PAH) as relevant	Fixed or indicative measurements
Total deposition of arsenic, cadmium, lead, nickel and mercury	Fixed or indicative measurements
Benzo(a)pyrene, other polycyclic aromatic hydrocarbons (PAH) as relevant ⁽¹⁾	Fixed or indicative measurements
Arsenic, cadmium, lead, and nickel	Fixed or indicative measurements
Chemical composition of PM _{2.5} in accordance with Section 1 of Annex VII	Fixed or indicative measurements
Total gaseous mercury	Fixed or indicative measurements

⁽¹⁾ Benzo(a)pyrene and the other polycyclic aromatic hydrocarbons referred to in Article 9(8).

Table 3 - Pollutants recommended to be measured at monitoring supersites at urban background locations and rural background locations if not covered by the requirements of Tables 1 and 2

Pollutant	Type of measurement
Size distribution of UFP	Fixed or indicative measurements
Particulate matter oxidative potential	Fixed or indicative measurements
Ammonia (NH ₃)	Fixed or indicative measurements
Levoglucosan to be measured as part of the chemical composition of PM _{2.5}	Fixed or indicative measurements
Total gaseous mercury	Fixed or indicative measurements
Particulate and gaseous divalent mercury	Fixed or indicative measurements
Nitric acid	Fixed or indicative measurements



Obligatory:

According to **Article 10**:

MS < 10 million inhabitants: one **urban** background. (**PNC + PNSD + BC**)

MS > 10 million inhabitants: one per 10 million **urban** background. (**PNC + PNSD + BC**)

MS 10.000 < 100.000 km²: one **rural** background (**PNC + BC + NH₃**)

MS > 100.000 km²: one **rural** background per 100.000 km² (**PNC + BC + NH₃**)

According to **Annex III** (D.)

One sampling point for UFP (**PNC**) every 5 million inhabitants where high UFP concentrations (industry, airport, domestic heating) are likely to occur.

Example Germany (83 million, 357.000 km²): 8 urban background and 3 rural background for Article 10, plus 16 UFP monitors (PNC) where high concentrations occur for Annex III.

Example Lithuania (2.9 million inhabitants, 65.000 km²): one urban background, one rural background for Article 10, plus one UFP monitor where high concentrations occur for Annex III.

Example Cyprus (0.9 million inhabitants, 9.300 km²): one urban background for Article 10, which can be combined with UFP monitoring where high concentrations occur for Annex III.

How to measure the new pollutants?

Annex VI on Reference Methods:

“In the absence of an EN standard method for sampling and measuring volatile organic compounds that are ozone precursor substances, methane, UFP, BC, size distribution of ultrafine particles, ammonia, particulate and gaseous divalent mercury, nitric acid, levoglucosan and oxidative potential of particulate matter, **Member States may choose the sampling and measuring methods they use. Where international, EN or national standard reference measurement methods or CEN technical specifications are available, these may be used.**”

Article 10:

“Where appropriate, **monitoring shall be coordinated** with the monitoring strategy and measurement programme of **EMEP**, the Aerosol, Clouds and Trace Gases Research Infrastructure (ACTRIS)”



Round table tour in September 2024 during AQUILA meeting:

Identification of knowledge gaps mainly regarding UFP

- which instruments to buy,
- costs,
- how to sample, operate, maintain and calibrate instruments,
- quality assurance and control,
- data output and data exchange.



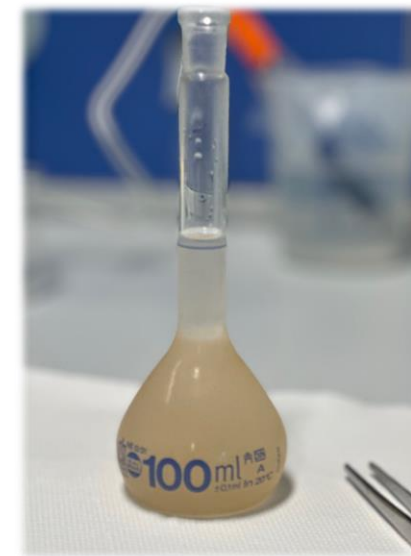
Series of training events addressing harmonised measurements of emerging pollutants of the new Air Quality Directive

- Training # 1: 23 January 2025
Aerosol particle number concentration
- Training # 2: 27 January 2025
Aerosol particle number size distribution
- Training # 3: 11 February 2025
Equivalent Black Carbon
- Training # 4: tbd
Data management
- *Training # xyz: Ammonia, oxidative potential, VOC,(...)*



RI URBANS Service Tools relevant for AQUILA

Number	Guidance document topic
<i>Protocols for the measurement of novel AQ pollutants</i>	
ST1	Ultrafine-Particle Number Size Distributions (UFP-PNSD)
ST2	Black Carbon (BC)
ST3	Offline and online particulate matter (PM) speciation
ST4	Oxidative potential of particulate matter (OP of PM)
ST5	Volatile Organic Compounds (VOCs)
ST6	Ammonia (NH ₃)



ST3

- EN 16909 (2017) - Measurement of elemental carbon (EC) and organic carbon (OC) collected on filters
- EN 16913 (2017) - Anions/cations on PM filters
- EN 14902 (2005) - Measurement of Pb/Cd/Ni/As in PM₁₀
- EN 15549 (2008) - Measurement of BaP
- CEN/TS 16645 (2014) - PAH (M/611 – C(2025)3162) [CEN WG 21](#)
- CEN/TS 18044 (2024) – Levoglucosan

ST5

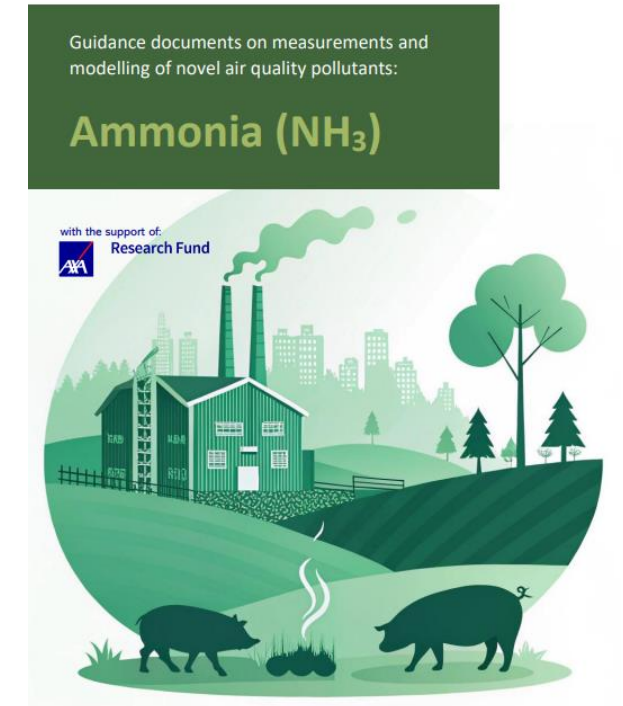
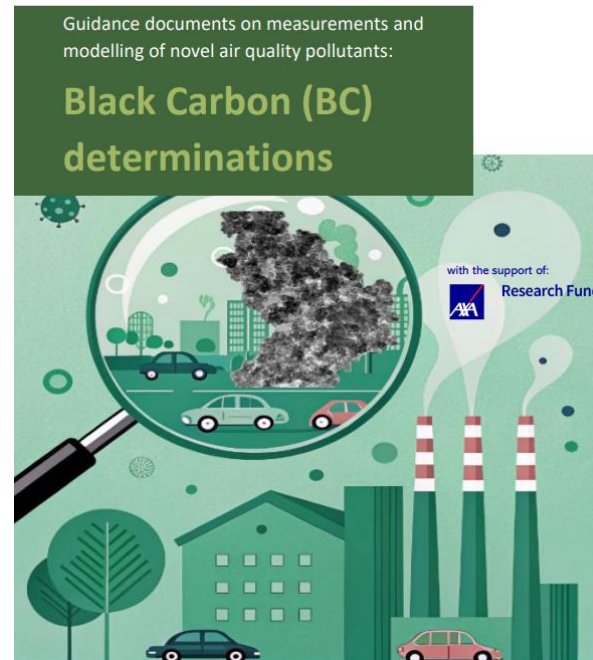
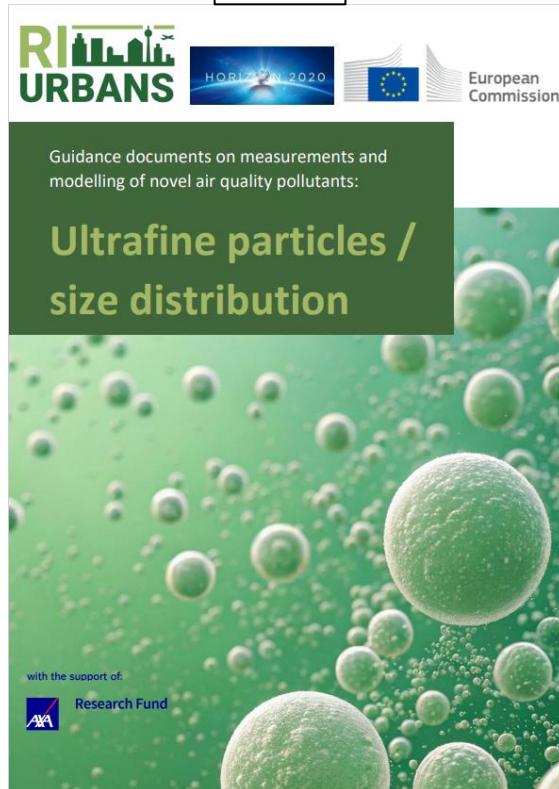
- EN 14662 series - Measurement of benzene
- M/561 (2019, Amd 1 – C(2025)3164) on VOC ozone precursors (six methods) [CEN WG 13](#)

Service tools relevant for AQUILA: background, typical data, available methods, recommendations, data management,

ST6

ST2

ST1



EN 17346 (2020) Ammonia by diffusive sampling

EN 16976 (2024) Particle number concentration
CEN/TS 17434 (2020) Particle number size distribution





Technical support documents

on website of DG ENV



Air Quality Monitoring for air quality policy

Technical support document on the use of reference and non-reference methods, and on the quality assurance process to meet relevant data quality objectives for regulated air pollutants

<https://data.europa.eu/doi/10.2779/6569975>

Air Quality Modelling for air quality policy

Technical support document on the use of modelling for various application domains under the Ambient Air Quality Directive

<https://data.europa.eu/doi/10.2779/3343596>

Update mechanism with AQUILA and FAIRMODE networks.



Next AQUILA meeting: 23-24 September 2025

Agenda comprises:

NRL presentations on implementation of new monitoring requirements

- *Supersites*
- *UFP measurement implementation*
- *Quality control*
- *Service tools*

Thank you