

**TECHNICAL SPECIFICATIONS FOR THE PROCUREMENT OF MEASURING SYSTEM FOR  
MEASURING PARTICULATE MATTER 2.5 CONCENTRATION ANALYZER PM<sub>2.5</sub>**

**A. GENERAL REQUIREMENTS**

Noncompliance with the following general requirements consists reason to reject the offer:

1. The equipment offered will be new and unused. If it is imported, it will be imported from the country of manufacture complete, without additional intervention that would change its operating conditions
2. The place of manufacture and the model of the instrument must be mentioned in the offer
3. The type approval shall indicate equivalence with the applicable reference method for the determination of the contaminant, and a copy of the certificate of conformity of the product (QAL1) shall be attached to the offer. The certificate for the PM<sub>2.5</sub> particulate matter analyzer will certify its equivalence with EN 11907: 2005 and EN16450: 2017, EN15267-1 (2009) and EN 15267-2 (2009). A necessary precondition for acceptance of the certificate is that the certification is valid on the date of submission of the offer.
4. The analyzer will be accompanied by a written guarantee of the manufacturer for a period of one (1) year after its final receipt, which will be submitted upon receipt. The guarantee will also cover the replacement of any spare part which will be required by spare parts of the same or higher specifications.
5. The analyzer will be accompanied with the required consumables for its good operation for one (1) year
6. The equipment and its operation must follow the certification framework as defined in the USEPA (40 CFR Part 53) and EU (2008/50 / EC) directives
7. The analyzer will be 24-hour operation with data recording 24/7 and will be accompanied with all the necessary equipment for operation in an ambient air environment
8. Provision of relevant certificates for calibration and maintenance of equipment
9. Supply of installation materials and consumables, technical support for the installation of the analyzer in the existing installed air quality monitoring station that already operates within the port area of PPA.

**B. SPECIAL REQUIREMENTS**

A) Automated ambient particulate matter analyzer for PM<sub>2.5</sub> (piece 1)

1. Operating principle: absorption of  $\beta$ -radiation
2. Type approval: Certificate of approval according to the standards EN 14907-2005, EN 15267-1: 2009, (QAL 1) (A<sub>Σ2,5</sub>)
3. Measuring possibilities: The collection of particles will be done through suitable sensor heads which will not need additional maintenance beyond their cleaning

4. Key features: Microprocessor-controlled automatic continuous particle concentration analyzer with analysis unit and touch screen display of concentrations
5. Analysis units: Describe in detail the analysis unit and all its technical characteristics (ie detection method, pump, sample flow filter tapes, etc.)
6. Certificate from the manufacturer stating the safety of the  $\beta$ -radiation source in accordance with the applicable specifications
7. Technical characteristics: a. measurement range: from 0 to at least 5000 $\mu\text{g} / \text{m}^3$ , b) Resolution: Less than or equal to 2  $\mu\text{g} / \text{m}^3$
8. Measurement time: At least one measurement every 1 hour
9. Operating flow: 1 $\text{m}^3 / \text{h}$
10. Flow accuracy:  $\pm 1\%$  with integrated stabilization system
- Detection limit: less than or equal to 2  $\mu\text{g} / \text{m}^3$  for 24-hour sampling at 1 $\text{m}^3 / \text{h}$
12. Accuracy: better than or equal to 5% of the maximum range for 24-hour sampling with a flow rate of 1 $\text{m}^3 / \text{h}$
13. Display: Digital display of the concentration on the screen
14. Concentration units:  $\mu\text{g} / \text{m}^3$
15. Operating temperature: +5  $^{\circ}\text{C}$  -40  $^{\circ}\text{C}$
16. Ports: Ethernet, RS 232 and analog output for connection to data logging system. Have a built-in storage of measurements and possible problems of the analyzer (diagnostics) lasting at least one month.
17. Power supply requirements: 220V / 50Hz
18. To be determined any effect of humidity on the determined particle concentration.
19. To have disposable a sufficient number of separate filters or filter tape capable of receiving a large number of measurements to provide autonomous operation for at least one month, under normal environmental pollution conditions (if filter tapes are required)
20. Have an integrated sample flow measurement system and user information system in case of flow differentiation from the set point
21. The entire device should have a water vapor condensation system, combined with the simultaneous avoidance of loss of measurement of volatile particles (volatile aerosols)
22. In case of power failure, it should be automatically restored to operation by restoring the voltage, without requiring the presence of a user
24. To be able to program the measurement rate and send the measurements.
25. Installation of end user software (user interface) to four (4) users

**C. GENERAL TERMS**

1. Delivery Time: one (1) – two (2) months from contract signing (DDP terms).
2. Warranty period: one (1) year
3. Payment terms: two (2) months upon invoice issuance