# *ANNEX II + III:* TECHNICAL SPECIFICATIONS + TECHNICAL OFFER

**Contract title: Supply of Air Quality Monitoring Equipment p 1 /…**

**Publication reference:** TRAP/MoEPP/MK/2018/TD03

**Columns 1-2 should be completed by the contracting authority**

**Columns 3-4 should be completed by the tenderer**

**Column 5 is reserved for the evaluation committee**

Annex III - the contractor's technical offer

The tenderers are requested to complete the template on the next pages:

* Column 2 is completed by the contracting authority shows the required specifications (not to be modified by the tenderer),
* Column 3 is to be filled in by the tenderer and must detail what is offered (for example the words ‘compliant’ or ‘yes’ are not sufficient)
* Column 4 allows the tenderer to make comments on its proposed supply and to make eventual references to the documentation

The eventual documentation supplied should clearly indicate (highlight, mark) the models offered and the options included, if any, so that the evaluators can see the exact configuration. Offers that do not permit to identify precisely the models and the specifications may be rejected by the evaluation committee.

The offer must be clear enough to allow the evaluators to make an easy comparison between the requested specifications and the offeredspecifications.

**Unless otherwise specified, the requirements in these Technical Specifications are presented as a minimum standard which the offered goods must meet in order to be compliant. Tenderers may not submit a variant solution for the items required in these Technical Specifications. When brand names are used in the technical specifications, they are “used in descriptive purposes only” since there is no other comprehensive description possible.**

***ANNEX II:* TECHNICAL SPECIFICATIONS**

**0.1 Minimum requirements and supporting documentation**

* Tenderers are required to demonstrate that the offered specifications are responsive to the Tender Dossier requirements identifying model, manufacturer and country of origin of each individual item in their Technical Offer. Tenderers are to provide necessary documentation (catalogues, guides, brochures, manuals, booklets, etc.) with detailed technical specifications of all items being offered thus enabling the Contracting Authority to verify the information provided in the offer.

**0.2 Completeness of the supply**

* Supply delivery, including installation, integration and final customization must include all needed parts, accessories and consumables required for the supplies to be presented for provisional acceptance fully installed, operational and ready for use.
* Consumables, accessories, parts and documentation used during delivery, installation, integration and customization before provisional acceptance must therefore be anticipated and calculated into the offer.
* It shall be the sole responsibility of the Contractor to ensure that all pre-requisites for the completeness of the supply delivery are met before its commencement.

**0.3 Supply delivery**

* The location of delivering and installation for each items and group of items is provided in Point 0.15 Place of Delivery. The exact locality for each installation will be agreed with the Beneficiary at the time of the commencement of the delivery.

**0.4 Conformity to regulations and standards**

* Items must conform to relevant regulations and standards, including any ISO, IEC, domestic or other relevant regulations and standards (e.g. CE marking) that apply to each specific item.

**0.5 Working Conditions and Safety Requirements**

* IT Equipment must comply to IEC 60 529 standard for indoor IT equipment operating under temperature range of 10°C – 40°C, relative humidity range of 20% – 80% and IP 20 protection level.
* Equipment must have safety operational warnings as well as mechanical interlocks for equipment operating under or generating more than 30V AC or DC, in line with current IEC and EU standards.
* The equipment that will be used outdoors will be subject to changing and often harsh weather conditions.
* The equipment that will be used indoors (inside the laboratories) is subject to normal laboratory conditions with ambient temperatures between +15o C and +35 o C, and humidity between 40 and 75 % RH. The instruments will operate a significant part of the time under high impact; so general operation and maintenance should be as simple as possible.

**0.6 Power Supply**

* The Beneficiary Countrypower grid standard supply voltage is 230V AC for single-phase voltage and 400V AC for three-phase voltage, with 50Hz nominal frequency. Equipment must be able to operate on 230V ± 20V (single-phase) or 400V ± 40V (three-phase), at 50Hz ± 0.5Hz, due to grid voltage fluctuations.
* The equipment must have ability to be connected to the standard of North Macedonia single phase power output connections.

**0.7 Software Licensing**

* Successful Tenderer must license all software to the Beneficiary to allow designated Beneficiary personnel to perform software installation, update/upgrade, repair/debug and diagnosis/report activities without any external assistance.

**0.9 General Requirements**

The equipment must include all the necessary parts and must comply with standards for its use.

User and service manuals for the equipment must be provided in English.

**0.10 Installation**

Equipment should be fully operational upon delivery.

**0.11 Testing**

Testing (verification of functionality) of complete equipment should be done in the presence of representatives of the end users.

**0.12 Equipment and Software Delivery Summary**

|  |  |  |
| --- | --- | --- |
| **Air Quality Monitoring Equipment** | | |
| 1 | Air quality Monitoring station (includes the following set of analyzers: PM2.5, PM10, O3, NO-NO2-NOx, SO2 and CO analyzers, container, Calibration gases with calibrator and zero gas generator meteorological equipment, Data acquisition system (Data logger, 4G GSM routers and software), PM10 (PM2.5, PM1) sequential standard reference sampler, PC (lap-top) | 1 |
| 2 | Automatic analyzer for measuring of suspended particulate matter PM10 | 1 |
| 3 | Automatic analyzer for measuring of suspended particulate matter PM2.5 | 1 |
| 4 | Sulphur dioxide (SO2) analyzer | 1 |
| 5 | Nitrogen dioxide and oxides of nitrogen (NO - NO2 – NOX) analyzer | 1 |
| 6 | Carbon monoxide (CO) analyzer | 1 |
| 7 | Ozone (O3) analyzer | 1 |
| 8 | Meteorological equipment | 1 |
| 9 | PM10 (PM2.5, PM1) sequential standard reference sampler | 1 |
| 10 | Data acquisition system (Data logger, 4G GSM router and software) | 1 |
| 11 | PC (Laptop) | 1 |
| 12 | Training | 1 |

**0.15 Place of Delivery**

Equipment and software are to be delivered (Table 2) as follows:

Table 2 Delivery locations

|  |  |  |
| --- | --- | --- |
| Nr | **Air Quality Monitoring Equipment** | Place of delivery |
| 1 | Air quality Monitoring station (includes the following set of analyzers: PM2.5, PM10, O3, NO-NO2-NOx, SO2 and CO analyzers, container, Calibration gases with calibrator and zero gas generator meteorological equipment, Data acquisition system (Data logger, 4G GSM router and software), PM10 (PM2.5, PM1) sequential standard reference sampler, PC (lap-top) | City of Gevgelija |
| 2 | Automatic analyzer for measuring of suspended particulate matter PM10 | Existing station Bitola 1, City of Bitola |
| 3 | Automatic analyzer for measuring of suspended particulate matter PM2.5 |
| 4 | Sulphur dioxide (SO2) analyzer |
| 5 | Nitrogen dioxide and oxides of nitrogen (NO - NO2 – NOX) analyzer |
| 6 | Carbon monoxide (CO) analyzer |
| 7 | Ozone (O3) analyzer |
| 8 | Meteorological equipment |
| 9 | PM10 (PM2.5, PM1) sequential standard reference sampler |
| 10 | Data acquisition system (Data logger, 4G GSM router and software) |
| 11 | PC (Laptop) |
| 12 | Training | Gevgelija and Bitola |

***ANNEX III:* THE CONTRACTOR'S TECHNICAL OFFER**

**Equipment Offered**

**Air Quality Monitoring Equipment**

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| **1. Item Number** | **2. Specifications Required** | | **3. Specifications Offered** | **4.  Notes, remarks,  ref to documentation** | **5. Evaluation Committee’s notes** |
| 1 | **Air quality Monitoring station (includes the following set of analyzers: PM2.5, PM10, O3, NO-NO2-NOx, SO2 and CO analyzers, container, Calibration gases with calibrator and zero gas generator meteorological equipment, Data acquisition system (Data loggers 4G GSM routers and software),** **PM10 (PM2.5, PM1) sequential standard reference sampler, PC (lap-top)** | **Quantity: 1** |  |  |  |
|  | Manufacturer’s name: | |  |  |  |
|  | Product type, model: | |  |  |  |
|  | **Specification** | |  |  |  |
| 1.1 | * Air quality Monitoring station installed in container must include the following set of analyzers and other elements: * 1 Automatic analyzer for measuring of suspended particulate matter PM10 as described in item 2; * 1 Automatic analyzer for measuring of suspended particulate matter PM2.5 as described in item 3; * 1 analyzer for Sulphur dioxide (SO2) as described in item 4; * 1 analyzer for Nitrogen dioxide and oxides of nitrogen (NO - NO2 – NOX) as described in item 5; * 1 analyzer for Carbon monoxide (CO) as described in item 6; * 1 analyzer for Ozone (O3) as described in item 7; * 1 Meteorological equipment as described in item 8; * 1 PM10 (PM2.5, PM1) sequential standard reference sampler as described in item 9; * 1 Data acquisition system (Data loggers, 4G GSM routers and software) as described in item 10; * 1 PC (Laptop) with local data base as described in item 11; * The detailed specifications of the individual analyzer are described below as Items 2, 3, 4, 5, 6,7, 8, 9, 10 and 11. | |  |  |  |
| 1.2 | * The supplier has the responsibility to fit the instrumentation into the station. | |  |  |  |
| 1.3 | * The Air quality monitoring station needs to fulfil the following requirements:   + The Air Quality Monitoring Stations must be designed and constructed to work as an integrated system and equipped with the monitoring; analysis, sensor, sampling and data logging / communication devices identified as sub-items;   + All equipment and parts should be accessible for operation and maintenance;   + The shelter for the Ambient Air Quality Monitoring Stations must fulfil at least the requirements described under items: 1.4, 1.5, 1.6, 1.7, 1.8, 1.9, 1.10, 1.11 and 1.12. | |  |  |  |
| 1.4 | * Design and dimensions:   + Approximately 3500 \* 2500 \* 2500 mm (L \* W \* H) +/- 5%;   + Construction enabling fixing of meteorological mast for anemometer and three sealed sampling probes (for gas analysers, PM10 and PM2.5) must be inserted on the roof with suitable flanges of non-corrosive material;   + Meteorological mast should be fixed on the container;   + Ventilation fan or exhaust at side wall,   + The complete container including all equipment, meteorological mast, sensors, etc. must be protected against lightning;   + Ability for transportation by crane via top four corners eye-bolt;   + Protection against electrical/magnetic interference – inside and external of shelter;   + Sampling heads, meteorological mast with sensors must be secured and tightened with tightrope cable. | |  |  |  |
|  |  |  |  |
| 1.5 | * Materials:   + The container shall consist of a brand new, white color container suitably constructed and equipped with all the necessary instruments for the specified measurements. All materials, which are used for the construction of the shelter, shall be new, high quality, with resistance to humidity, dust and corrosive environment. The construction shall be of water proof, leak proof, and dust proof construction;   + The insulation factor should be better than 0.6 W/m² K. | |  |  |  |
| 1.6 | * Doors:   + The shelter should have at least one door. Door (doors) should be with staircase and equipped with a doubled security lock (3 point high quality steel stick inside the door) and alarm for intruders. | |  |  |  |
| 1.7 | * Roof:   + The roof should be flat enabling fixing of sampling systems. The roof should be covered with anti-slip material and properly fenced against fall of persons working on it. There should sufficient drainage or gradient to prevent of water of staying. Roof construction should be capable of minimum 300 kg loading. | |  |  |  |
| 1.8 | * Floor:   + The floor should be made of a water-resistant wooden board with rubber lining and covered with anti-static material. | |  |  |  |
| 1.9 | * Interior:   + A desk plus drawers’ bench with adequate storage space and suitably arranged should be placed in the shelter. A chair of good quality made out of antistatic material should be provided;   + The installed lighting should be in accordance to the valid lighting standards in EC for operation and maintenance of the equipment;   + At least one fire extinguishers;   + Minimum three-cylinder holders for calibration gases 10 L bottles;   + 1 (one) ladder shall be included in the offer, with height of at least 3 m. | |  |  |  |
| 1.10 | * Installation analysers and devices:   + Minimum 2 pieces 19" racks suitable for offered instruments. The rack cabinets shall be shock and vibration proofed. | |  |  |  |
| 1.11 | * Assurance of stable temperature inside the container:   + Temperature inside the container shall be kept at 20 ± 2 °C by means of a suitable air condition system inverter at least 3.5 KW with option of self-restart after possible losing of power, controlled by internal thermostats during summer conditions and a heater during winter conditions. There shall be a function for cutting off the analyzers when the temperature reaches outside a preset interval. Additional heater is required. | |  |  |  |
| 1.12 | * Electric installation:   + Power line 3 \* 230 V / 400 V;   + All electrical and/or analytical equipment to run on 230 VAC power supply;   + Automatic voltage stabilizer: 2100W/ 3 kVA;   + Electric protections, power plugs and sockets;   + UPS (30 minutes minimum) for all monitoring, analysis, sensor, sampling and data logging / communication devices operating at full power separated outlets connected to the UPS. UPS outlets for monitors and data equipment and non-UPS outlets for heating and cooling equipment need to be clearly labelled;   + There shall be separate groundings for power and signal (instrument); | |  |  |  |
| 1.13 | * Additional requirements:   + Glass manifold unit for the gaseous measurement instruments with at least 8 outlets. | |  |  |  |
| 1.14 | * **Calibration gases with calibrator and zero gas generator:**   + 1 set of 3 gas cylinders 10 liters (NO, SO2 and CO) shall be installed in air quality monitoring station container,   + 1 calibrator shall be installed in air quality monitoring station container;   + 1 zero gas generator with oil free compressor (at least 10 liters) shall be installed in air quality monitoring. | |  |  |  |  |
| * + Manufacturer’s name: | |  |  |  |
| * + Product type, model: | |  |  |  |
| * + **Specifications** | |  |  |  |
| 1.14.1 | Cylinder size: 10 L.   * Cylinders: Aluminium cylinder type F10A 10 L complete stainless-steel valve with TÜV certificate; * Full pressure: 150 bar; * Stability period: Minimum 12 months; * Accuracy: ± 2 % maximum. * 1 (one) Span gas cylinder NO with certificate from reference laboratory: 10 L gas cylinder for NO -- 20 ppm in N2 (purity at least 5.0). The delivery must include cylinder with two stage stainless steel pressure regulators; * 1 (one) Span gas cylinder SO2 with certificate from reference laboratory: 10 L gas cylinder for SO2 -- 20 ppm in N2 (purity at least 5.0). The delivery must include cylinder with two stage stainless steel pressure regulators; * 1 (one) Span gas cylinder CO with certificate from reference laboratory: 10 L gas cylinder for CO -- 800 ppm in N2 (purity at least 5.0). The delivery must include cylinder with two stage brass or similar pressure regulators. | |  |  |  |
| 1.14.2 | 1 (one) Calibrator:   1. Dynamic dilution system enabling:    * multipoint calibration with at least five points;    * automatic calculation of dilution and span gas based on commanded concentration. 2. Diluter and diluted gas flow rate measurement:    * Mass flow controllers (MFC) with parameters at least:      + accuracy ≤ ± 1 % full scale;      + linearity ≤ ± 1 % full scale;      + repeatability ≤ ± 1 % full scale. 3. Dilution ranges: Regulated flow rate.    * At least 0 -- 50 mL/min for diluted gas;    * At least 0 -- 10 L/min for diluter. 4. Controlling Remote:    * Via DAS by RS-232 port or Ethernet connectivity at least:      + starting and ending of calibration;      + setting of concentrations;      + controlling of multipoint calibration sequence.    * Via analyzer at least:      + starting and ending of calibration. 5. Controlling Local:    * By calibrator keyboard at least:      + starting and ending of calibration;      + setting of concentrations;      + controlling of multipoint calibration sequence. 6. NO2 and O3 calibration:    * Built-in ozone generator stabilized via optical feedback sensor;    * Delivery > 500 ppb at 5 L /min;    * Stability ≤ ± 1 % / 7 days;    * Built-in GPT box with glass reaction chamber. 7. Gas inlets:    * Appropriate inlets for connection of external span gas cylinder. 8. Power:    * 220 -- 240 V AC, 50 Hz. 9. Dimensions:    * Fit into a standard 19" rack. | |  |  |  |
| 1.14.3 | 1 (one) Zero gas generator:   1. System for generation of air free of gas pollutants, equipped with oil-free compressor (at least 10 litres), automated generation of zero air only when there is a demand, compatible with system described above:    1. Moisture removing: Maintenance free dryer (fan maintenance free);    * SO2, NO, NO2, CO, O3 removing: Adsorbing columns (scrubbers);    * Maximum impurities: Lower than detection limit of the analyzers;    * Power: 220 -- 240 V AC, 50 Hz;    * Dimensions: Fit into a standard 19" rack. | |  |  |  |

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| **1. Item Number** | **2. Specifications Required** | | **3. Specifications Offered** | **4.  Notes, remarks,  ref to documentation** | **5. Evaluation Committee’s notes** |
| 2 | **Automatic analyzer for measuring of suspended particulate matter PM10** | **Quantity: 1** |  |  |  |
|  | Manufacturer’s name: | |  |  |  |
|  | Product type, model: | |  |  |  |
|  | **Specifications** | |  |  |  |
| 2.1 | * **Principle:**   Oscillating microbalances, ß-ray attenuation, or *insitu* optical methods | |  |  |  |
| 2.2 | * **Certification:**   Certificate which shows the conformity of the analyser in accordance with EN12341:1999 or EN12341:2014 for PM10 is required and should be in the offer. Full Test Report shall demonstrate the equivalency of the tested analyser with the reference method according to the EN12341:1999 or EN12341:2014 for PM10. The test of equivalence needs to be carrying out according to the Guide to the Demonstration of Equivalence (GDE) of Ambient Air Monitoring Methods. The tested analyser shall meet all the performance requirements of the reference method according to the EN12341:1999 or EN12341:2014 for PM10. Full Test Report is required and should be in offer. The laboratory performing the tests of the analyser must be accredited according to EN ISO/IEC 17025 for the specific test procedures. | |  |  |  |
| 2.3 | * **The fraction of suspended particle measurements:**   PM 10 size selective inlet or non-size selective inlet in case of optical method | |  |  |  |
| 2.4 | * **Sampling system:**   Metal pipe of stainless steel or stainless steel with humidity extraction (for example: membrane, heated coil etc.) | |  |  |  |
| 2.5 | * **Ranges:**   Different selectable: 0-1mg/m3 or 0-6 mg/m3 or 0-10 mg/m3 | |  |  |  |
| 2.6 | * **Lower detectable limit:**   ≤ 2 µg/m3. | |  |  |  |
| 2.7 | * **Measuring cycles:**   Maximum 1 hour. | |  |  |  |
| 2.8 | * **Measuring medium:**   Depends on the principle of operation. | |  |  |  |
| 2.9 | * **Flow rate of the sample:**   In case of size selective inlets: 1m3 /hour or defined by the manufacturer if non size-selective inlet. | |  |  |  |
| 2.10 | * **Flow rate accuracy:**   ≤ 2 % of sampling flow rate. | |  |  |  |
| 2.11 | * **Vacuum pump**   Service interval min. 1 year. | |  |  |  |
| 2.12 | * **Input/Output signal:**   Digital control signals (calibration and statuses), RS-232C serial connection. | |  |  |  |
| 2.13 | * **Communication ports:**   Digital, at least 1XRS232, optional Analog 4 – 20 mA. | |  |  |  |
| 2.14 | * **User interface:**   Software controlled from multi line menu with keys. | |  |  |  |
| 2.15 | * **Calibration:**   Calibration of instrument sensors (temperature, flow rate, pressure and humidity) and mass measuring system need to be provided by bidder according to manufacturer recommendation;  Certificates from the calibrations should be provided;  For measuring instrument should be provided calibration kit, if applicable, according to the manufacturer manual. | |  |  |  |
| 2.16 | * **Service set:**   Service and maintenance including consumable kits for the normal operation according to the manufacturer manual for a period of 5 years, separately for each of the measuring instruments. | |  |  |  |
| 2.17 | * **Power:**   220 -- 240 V AC, 50 Hz. | |  |  |  |
| 2.18 | * **Dimensions:**   Fit into a standard 19" rack. | |  |  |  |
| 2.19 | * **Installation:**   Instrument must be installed at the existing monitoring station on 19" rack by the bidder;  Sampling probe of analyzer must be installed by the bidder on the roof with suitable flanges of non-corrosive material. | |  |  |  |

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| **1. Item Number** | **2. Specifications Required** | | **3. Specifications Offered** | **4.  Notes, remarks,  ref to documentation** | **5. Evaluation Committee’s notes** |
| 3 | **Automatic analyzer for measuring of suspended particulate matter PM2.5** | **Quantity: 1** |  |  |  |
|  | Manufacturer’s name: | |  |  |  |
|  | Product type, model: | |  |  |  |
|  | **Specifications** | |  |  |  |
| 3.1 | * **Principle:**   Oscillating microbalances, ß-ray attenuation, or insitu optical methods | |  |  |  |
| 3.2 | * **Certification:**   Certificate which shows the conformity of the analyser in accordance with EN14907:2005 or EN12341:2014 for PM2.5 is required and should be in the offer. Full Test Report shall demonstrate the equivalency of the tested analyser with the reference method according to the EN14907:2005 or EN12341:2014 for PM2.5. The test of equivalence needs to be carrying out according to the Guide to the Demonstration of Equivalence (GDE) of Ambient Air Monitoring Methods. The tested analyser shall meet all the performance requirements of the reference method according to the EN14907:2005 or EN12341:2014 for PM 2.5. Full Test Report is required and should be in offer. The laboratory performing the tests of the analyser must be accredited according to EN ISO/IEC 17025 for the specific test procedures. | |  |  |  |
| 3.3 | * **The fraction of suspended particle measurements:**   PM 2.5 size selective inlet or non-size selective inlet in case of optical method | |  |  |  |
| 3.4 | * **Sampling system:**   Metal pipe of stainless steel or stainless steel with humidity extraction (for example: membrane, heated coil etc.) | |  |  |  |
| 3.5 | * **Ranges:**   Different selectable: 0-1mg/m3 or 0-6 mg/m3 or 0-10 mg/m3. | |  |  |  |
| 3.6 | * **Lower detectable limit:**   ≤ 2 µg/m3. | |  |  |  |
| 3.7 | * **Measuring cycles:**   Maximum 1 hour. | |  |  |  |
| 3.8 | * **Measuring medium:**   Depends on the principle of operation. | |  |  |  |
| 3.9 | * **Flow rate of the sample:**   In case of size selective inlets: 1m3 /hour or defined by the manufacturer if non size-selective inlet. | |  |  |  |
| 3.10 | * **Flow rate accuracy:**   ≤ 2 % of sampling flow rate | |  |  |  |
| 3.11 | * **Vacuum pump**   Service interval min. 1 year | |  |  |  |
| 3.12 | * **Input/Output signal:**   Digital control signals (calibration and statuses), RS-232C serial connection. | |  |  |  |
| 3.13 | * **Communication ports:**   Digital, at least 1XRS232, optional Analog 4 – 20 mA | |  |  |  |
| 3.14 | * **User interface:**   Software controlled from multi line menu with keys. | |  |  |  |
| 3.15 | * **Calibration:**   Calibration of instrument sensors (temperature, flow rate, pressure and humidity) and mass measuring system need to be provided by bidder according to manufacturer recommendation;  Certificates from the calibrations should be provided;  For measuring instrument should be provided calibration kit if applicable according to the manufacturer manual. | |  |  |  |
| 3.16 | * **Service set:**   Service and maintenance including consumable kits for the normal operation according to the manufacturer manual for a period of 5 years. | |  |  |  |
| 3.17 | * **Power:**   220 -- 240 V AC, 50 Hz. | |  |  |  |
| 3.18 | * **Dimensions:**   Fit into a standard 19" rack. | |  |  |  |
| 3.19 | * **Installation:**   Instrument must be installed at the existing monitoring station on 19" rack by the bidder;  Sampling probe of analyzer must be installed by the bidder on the roof with suitable flanges of non-corrosive material. | |  |  |  |

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| **1. Item Number** | **2. Specifications Required** | | **4. Specifications Offered** | **4.  Notes, remarks,  ref to documentation** | **5. Evaluation Committee’s notes** |
| 4 | **Sulphur dioxide (SO2) analyzer** | **Quantity: 1** |  |  |  |
|  | Manufacturer’s name: | |  |  |  |
|  | Product type, model: | |  |  |  |
| 4.1 | * **Principle:**   UV Fluorescence | |  |  |  |
| 4.2 | * **Certification:**   Certificate which shows the conformity of the analyser in accordance with EN14212:2012 is required and should be in the offer. Full Type Approval Test Report shall demonstrate that the tested analyser meets all the performance requirements of the reference method according to the EN 14212:2012. Full Type Approval Test Report is required and should be in offer. The laboratory performing the tests of the analyser must be accredited according to EN ISO/IEC 17025 for the specific test procedures. | |  |  |  |
| 4.3 | * **Ranges:**   0 -- 50, 100, 200, 500, 1.000, 10.000 and 20.000 ppb. | |  |  |  |
| 4.4 | * **Ranging:**   Manual, automatic and remote controlled. | |  |  |  |
| 4.5 | * **Lower detectable limit:**   ≤ 0.4 ppb. | |  |  |  |
| 4.6 | * **Zero noise:**   ≤ 0.25 ppb. | |  |  |  |
| 4.7 | * **System for zero/span check:**   Valves for external Zero/Span check controlled by the data logger, from the front panel and remotely by the PC at the station. | |  |  |  |
| 4.8 | * **Internal pump** | |  |  |  |
| 4.9 | * **Compensation:**   Pressure and temperature. | |  |  |  |
| 4.10 | * **Calibration:**   Initiated manually on side using the keys of the analyser. Remote by using the computer on side or central computer and data transmission. | |  |  |  |
| 4.11 | * **Input:**   Standard I/O. | |  |  |  |
| 4.12 | * **Output:**   Serial interface RS-232/RS-485, status relays (failure, zero, span), 1 Ethernet 10/100, optional USB port, optional selectable voltage, analogue voltage output, software selectable range, at least one 4-20 mA current output and power indication. | |  |  |  |
| 4.13 | * **Remote diagnostic:**   Remote connectivity. | |  |  |  |
| 4.14 | * **Connection to data logger:**   Digitally (Ethernet or RS-232). | |  |  |  |
| 4.15 | * **User interface:**   Software controlled from multi line menu with keys. Adjustable display. | |  |  |  |
| 4.16 | * **Service set:**   Service and maintenance including consumable kits for the normal operation according to the manufacturer manual for a period of 5 years. | |  |  |  |
| 4.17 | * **Power:**   220 -- 240 V AC, 50 -- 60 Hz. | |  |  |  |
| 4.18 | * **Dimensions:**   Fit into a standard 19" rack. | |  |  |  |

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| **1. Item Number** | **2. Specifications Required** | | **3. Specifications Offered** | **4.  Notes, remarks,  ref to documentation** | **5. Evaluation Committee’s notes** |
| 5 | **Nitrogen dioxide and oxides of nitrogen (NO - NO2 – NOX) analyzer** | **Quantity: 1** |  |  |  |
|  | Manufacturer’s name: | |  |  |  |
|  | Product type, model: | |  |  |  |
|  | **Specifications** | |  |  |  |
| 5.1 | * **Principle:**   Chemiluminescence | |  |  |  |
| 5.2 | * **Certification:**   Certificate which shows the conformity of the analyser in accordance with EN14211:2012 is required and should be in the offer. Full Type Approval Test Report shall demonstrate that the tested analyser meets all the performance requirements of the reference method according to the EN 14211:2012. Full Type Approval Test Report is required and should be in offer. The laboratory performing the tests of the analyser must be accredited according to EN ISO/IEC 17025 for the specific test procedures | |  |  |  |
| 5.3 | * **Ranges:**   0 -- 50, 100, 200, 500, 1,000, 10.000 and 20.000 ppb. | |  |  |  |
| 5.4 | * **Ranging:**   Manual, automatic and remote controlled | |  |  |  |
| 5.5 | * **Lower detectable limit:**   ≤ 0.4 ppb depending on averaging time. | |  |  |  |
| 5.6 | * **Zero noise:**   ≤ 0.25 ppb | |  |  |  |
| 5.7 | * **Compensation:**   Pressure and temperature | |  |  |  |
| 5.8 | * **Internal pump** | |  |  |  |
| 5.9 | * **Calibration:**   Initiated manually on side using the keys of the analyser. Remote by using the computer on side or central computer and data transmission | |  |  |  |
| 5.10 | * **Input:**   Standard I/O. | |  |  |  |
| 5.11 | * **Output:**   Serial interface RS-232/RS-485, status relays (failure, zero, span), 1 Ethernet 10/100, optional USB port, optional selectable voltage, analogue voltage output, software selectable range, at least one 4-20 mA current output and power indication. | |  |  |  |
| 5.12 | * **Remote diagnostic:**   Remote connectivity. | |  |  |  |
| 5.13 | * **Connection to data logger:**   Digitally (Ethernet or RS-232)). | |  |  |  |
| 5.14 | * **User interface:**   Software controlled from multi line menu with keys. Adjustable display. | |  |  |  |
| 5.15 | * **Service set:**   Service and maintenance including consumable kits for the normal operation according to the manufacturer manual for a period of 5 years | |  |  |  |
| 5.16 | * **Power:**   220 -- 240 V AC, 50 -- 60 Hz. | |  |  |  |
| 5.17 | * **Dimensions:**   Fit into a standard 19" rack. | |  |  |  |

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| **1. Item Number** | **2. Specifications Required** | | **3. Specifications Offered** | **4.  Notes, remarks,  ref to documentation** | **6. Evaluation Committee’s notes** |
| 6 | **Carbon monoxide (CO) analyzer** | **Quantity: 1** |  |  |  |
|  | Manufacturer’s name: | |  |  |  |
|  | Product type, model: | |  |  |  |
|  | **Specifications** | |  |  |  |
| 6.1 | * **Principle:**   Non dispersive infrared absorption | |  |  |  |
| 6.2 | * **Certification:**   Certificate which shows the conformity of the analyzer in accordance with EN14626:2012 is required and should be in the offer. Full Type Approval Test Report shall demonstrate that the tested analyzer meets all the performance requirements of the reference method according to the EN 14626:2012. Full Type Approval Test Report is required and should be in offer. The laboratory performing the tests of the analyzer must be accredited according to EN ISO/IEC 17025 for the specific test procedures. | |  |  |  |
| 6.3 | * **Ranges:**   0-1, 2, 5, 10, 20, 50, 100, 200, 500 and 1.000 ppm. | |  |  |  |
| 6.4 | * **Ranging:**   Manual, automatic and remote controlled | |  |  |  |
| 6.5 | * **Lower detectable limit:**   ≤ 0.04 ppm | |  |  |  |
| 6.6 | * **Zero noise:**   ≤ 0.02 ppm | |  |  |  |
| 6.7 | * **System for zero/span check:**   Valves for external Zero/Span check controlled by the data logger, from the front panel and remotely by the PC at the station. | |  |  |  |
| 6.8 | * **Internal pump** | |  |  |  |
| 6.9 | * **Compensation:**   Pressure and temperature. | |  |  |  |
| 6.10 | * **Calibration:**   Initiated manually on side using the keys of the analyser. Remote by using the computer on side or central computer and data transmission. | |  |  |  |
| 6.11 | * **Input:**   Standard I/O. | |  |  |  |
| 6.12 | * **Output:**   Serial interface RS-232/RS-485, status relays (failure, zero, span), 1 ethernet 10/100, at least 1 USB port, optional selectable voltage, analogue voltage output, software selectable range, at least one 4-20 mA current output and power indication. | |  |  |  |
| 6.13 | * **Remote diagnostic:**   Remote connectivity | |  |  |  |
| 6.14 | * **Connection to data logger:**   Digitally (Ethernet or RS-232) | |  |  |  |
| 6.15 | * **User interface:**   Software controlled from multi line menu with keys. Adjustable display | |  |  |  |
| 6.16 | * **Service set:**   Service and maintenance including consumable kits for the normal operation according to the manufacturer manual for a period of 5 years. | |  |  |  |
| 6.17 | * **Power:**   220 -- 240 V AC, 50 -- 60 Hz. | |  |  |  |
| 6.18 | * **Dimensions:**   Fit into a standard 19" rack | |  |  |  |

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| **1. Item Number** | **2. Specifications Required** | | **3. Specifications Offered** | **4.  Notes, remarks,  ref to documentation** | **5. Evaluation Committee’s notes** |
| 7 | **Ozone (O3) analyzer** | **Quantity: 1** |  |  |  |
|  | Manufacturer’s name: | |  |  |  |
|  | Product type, model: | |  |  |  |
|  | **Specifications** | |  |  |  |
| 7.1 | * **Principle:**   UV Absorption | |  |  |  |
| 7.2 | * **Certification:**   Certificate which shows the conformity of the analyser in accordance with EN14625:2012 is required and should be in the offer. Full Type Approval Test Report shall demonstrate that the tested analyser meets all the performance requirements of the reference method according to the EN 14625:2012. Full Type Approval Test Report is required and should be in offer. The laboratory performing the tests of the analyser must be accredited according to EN ISO/IEC 17025 for the specific test procedures. | |  |  |  |
| 7.3 | * **Ranges:**   0 – 100, 200, 500, 1,000 and 10,000 ppb | |  |  |  |
| 7.4 | * **Ranging:**   Manual, automatic and remote controlled. | |  |  |  |
| 7.5 | * **Lower detectable limit:**   ≤ 0.5 ppb | |  |  |  |
| 7.6 | * **Zero noise:**   ≤ 0.25 ppb. | |  |  |  |
| 7.7 | * **System for zero/span check:**   Valves for external Zero/Span check controlled by the data logger, from the front panel and remotely by the PC at the station. | |  |  |  |
| 7.8 | * **Internal pump** | |  |  |  |
| 7.9 | * **Compensation:**   Pressure and temperature | |  |  |  |
| 7.10 | * **Calibration:**   Initiated manually on side using the keys of the analyser. Remote by using the computer on side or central computer and data transmission | |  |  |  |
| 7.11 | * **Input:**   Standard I/O. | |  |  |  |
| 7.12 | * **Output:**   Serial interface RS-232/RS-485, status relays (failure, zero, span), 1 Ethernet 10/100, optional USB port, optional selectable voltage, analogue voltage output, software selectable range, at least one 4-20 mA current output and power indication. | |  |  |  |
| 7.13 | * **Remote diagnostic:**   Remote connectivity | |  |  |  |
| 7.14 | * **Connection to data logger:**   Digitally (Ethernet or RS-232) | |  |  |  |
| 7.15 | * **User interface:**   Software controlled from multi line menu with keys. Adjustable display | |  |  |  |
| 7.16 | * **Service set:**   Service and maintenance including consumable kits for the normal operation according to the manufacturer manual for a period of 5 years. | |  |  |  |
| 7.17 | * **Power:**   220 -- 240 V AC, 50 -- 60 Hz. | |  |  |  |
| 7.18 | * **Dimensions:**   Fit into a standard 19" rack | |  |  |  |

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| **1. Item Number** | **2. Specifications Required** | | **3. Specifications Offered** | **4.  Notes, remarks,  ref to documentation** | **5. Evaluation Committee’s notes** |
| 8 | **Meteorological equipment –Air Quality Monitoring Station** | **Quantity: 1** |  |  |  |
|  | Manufacturer’s name: | |  |  |  |
|  | Product type, model: | |  |  |  |
|  | **Specifications** | |  |  |  |
| 8.1 | **Basic features:**  Weight max. 1.7 kg;  Interface RS485, 2 - wire, half – duplex;  Power supply: 4...32 VDC;  Operating temperature: -50...60 °C;  Operating rel. humidity: 0...100 % RH;  Heating: 20 VA (heater);  Cable length: 10 m;  Protection level housing: IP66;  Mast mounting suitable for Mast diameter: 60 - 76 mm. | |  |  |  |
| 8.2 | **Wind speed sensor:**  Principle: Ultrasonic;  Measuring range: 0 ... 75 m/s;  Unit: m/s;  Accuracy: ±0.3 m/s or ±3 % (0...35 m/s) ±5 %  (>35 m/s) RMS;  Resolution: 0.1 m/s**.** | |  |  |  |
| 8.3 | **Wind direction sensor:**  Principle: Ultrasonic;  Measuring range: 0 ... 359.9 °;  Unit: °;  Accuracy: < 3° RMSE > 1.0 m/s. | |  |  |  |
| 8.4 | **Temperature sensor:**  Principle: NTC;  Measuring range: -30 °C to + 45 °C or higher;  Unit: °C;  Accuracy: ±0.2 °C (-20...50 °C), otherwise ±0.5 °C (>-30 °C). | |  |  |  |
| 8.5 | **Humidity sensor**  Principle: Capacitive;  Measuring range: 0 ... 100 % RH;  Unit: % RH;  Accuracy: ±2 % RH; | |  |  |  |
| 8.6 | **Global radiation sensor**  **Measurement method:** Silicon photo diode or thermopile;  Response time (95%): < 1 s;  Non-stability (change/year): +/- 1 %;  Non-linearity (0 to 1,000W/m²): +/- 1 %;  Directional error: < 30 W/m²;  Temperature dependence of sensitivity: < 5 %;  Spectral range: 300...1100 nm;  Measuring range: 1400 W/m². | |  |  |  |
| 8.7 | **Barometric pressure sensor**  Principle: MEMS capacitive;  Measuring range: 300 ... 1200 hPa;  Unit: hPa;  Accuracy: ±0.5 hPa (0...40 °C). | |  |  |  |
| 8.8 | **Installation:**  Meteorological equipment shall be installed on monitoring station. | |  |  |  |

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| **1. Item Number** | **2. Specifications Required** | | **3. Specifications Offered** | **4.  Notes, remarks,  ref to documentation** | **5. Evaluation Committee’s notes** |
| 9 | **PM10 (PM2.5, PM1) sequential standard reference sampler** | **Quantity: 1** |  |  |  |
|  | Manufacturer’s name: | |  |  |  |
|  | Product type, model: | |  |  |  |
|  | **Specifications** | |  |  |  |
| 9.1 | * **Flow rate**   Variable from 1,0 m³/h up to 2,3 m³/h | |  |  |  |
| 9.2 | * **Pump:**   Controlled pump flows: 1.0 and 2.3 m³ / h, according to ambient temperature (T) and ambient air pressure (P), built-in P and T sensors. Maximum capacity of 6 m³/h. | |  |  |  |
| 9.3 | * **Sampling time**   Minimum 1 h – maximum 168 h per filter. | |  |  |  |
| 9.4 | * 2 (two) magazine boxes: 1 (one) magazine box for the blank filters and 1 (one) magazine box for sampled filters; * Magazine boxes should be able to load minimum 16 filter holders, each; * At least 16 filter holders should be delivered with the magazine boxes. | |  |  |  |
| 9.5 | * **Deviation from the set point** **of flow rates:**   < 2 %. | |  |  |  |
| 9.6 | * **Power supply**   230 V, 50/60 Hz. | |  |  |  |
| 9.7 | * **Interface**   RS232;  USB 2.0. | |  |  |  |
| 9.8 | * **Consumption**   ≤ 450 VA. | |  |  |  |
| 9.9 | * **Sampling filter diameter**   47 – 50 mm;  Diameter of active filter area 38 - 42 mm | |  |  |  |
| 9.10 | * **Dimensions**   Width max 600 mm;  Depth max 400 mm;  Height with inlet max 1,70 m;  Weight: Max 80 kg | |  |  |  |
| 9.11 | * **Noise level according to DIN 2058**   in a distance of 8 m << 35 dBA | |  |  |  |
| 9.12 | **Features:** | |  |  |  |
|  | * Cooling of the magazine for the sampled filters to < 23 °C according to CEN EN 12341:2014 (up to 35 °C ambient temperature); * Measurement of the temperature of the sampled filters directly inside the magazine (not the temperature of the cold air flow close to the cooler); * Covered filters within the magazine; * Data storage on USB and memory Stick; * Sampling system equipped with sheath air; * Temperature measurement directly downstream the filter; * Stainless steel sampling tube type V2A, which is insulated from ambient influences and allows sampling conditions in accordance with EN 12341: 2014; * Impactor inlets with exchangeable jets (1 set: 8 pieces, each) for PM10 – PM2,5 – PM1); * TSPM Inlet (VDI 2463 parts 5 and 8); * Impactor inlet with ozone denuder for PAHs (BaP) (CEN EN 15549); * Use of filters with diameters of 47 mm and 50 mm; * Housing shall be for external use of sampler; * Connection to a data logger, as well as providing real-time data transmission to a central data acquisition system with all parameters of the sampler status operation (number of filters, filter flows, temperatures, pressures); * Base: Mobile platform with wheels for easy transfer and manipulation of the sampler. | |  |  |  |
| 9.13 | **Inlets:** | |  |  |  |
|  | * Use of all PMX Inlets (without filter holder) for the flow rates of 3,0 - 2,3 - 1,0 m³/h; * PM10 and PM2,5 measurements according to CEN EN 12341:2014; * Total dust measurement according to VDI 2463 Parts 5 and 8; * PAH (BaP) measurement according to CEN EN 15549 and Directive 2004/107/EC; * Measurements of heavy metals according to CEN EN 14902. | |  |  |  |
| 9.12 | **Service sets:** | |  |  |  |
|  | * 3 sets of pump vanes; * 2 sets (minimum 32) filter holders; * 2 magazine boxes for filter holders. | |  |  |  |
| 9.13 | **Installation:** | |  |  |  |
|  | * PM10 (PM2.5, PM1) sequential standard reference sampler shall be installed next to monitoring station. | |  |  |  |

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| **1. Item Number** | **2. Specifications Required** | | **3. Specifications Offered** | **4.  Notes, remarks,  ref to documentation** | **5. Evaluation Committee’s notes** |
| 10 | **Data acquisition system (Data logger, 4G GSM router and software)** | **Quantity: 1** |  |  |  |
|  | Manufacturer’s name: | |  |  |  |
|  | Product type, model: | |  |  |  |
|  | **Specifications** | |  |  |  |
| 10.1 | The Supplier shall enable the central AQMS to communicate with the monitoring stations via 4G GSM router. | |  |  |  |
| 10.2 | **1 4G GSM router** should be included in the offer. | |  |  |  |
| 10.3 | **1 Data logger** should be included in the offer. | |  |  |  |
| 10.4 | Data logger should archive the data from the measuring instruments. | |  |  |  |
| 10.5 | Data logger should communicate with the PC. | |  |  |  |
| 10.6 | Data logger should communicate and control environmental analyzers, meteorological equipment and calibration dilution systems at the new monitoring station and 1 existing monitoring stations. | |  |  |  |
| 10.7 | Data logger should have open protocol for communication with existing Air Quality Data Management/Collection System – AIRVIRO via 4G GSM router. | |  |  |  |
| 10.8 | At least 6 x RS232 communication ports for communication with the equipment at the new monitoring station and 1 existing monitoring stations. | |  |  |  |
| 10.9 | At least 2 x RS485 communication ports for communication with the equipment at the new monitoring station and 1 existing monitoring stations. | |  |  |  |
| 10.10 | At least 4 x USB ports for communication with the equipment at the new monitoring station and 1 existing monitoring stations. | |  |  |  |
| 10.11 | At least 2 x 100/1000 Ethernet for transfer of the data to the central software and access to the equipment at the new monitoring station and 1 existing monitoring stations. Separated ports for connection of equipment for communication to internet (WAN port) and port for communication with measuring equipment from the station (LAN port). | |  |  |  |
| 10.12 | A/D convertor for acquisition of at least 8 analog data in voltage and current data. | |  |  |  |
| 10.13 | Internal memory for storage of data in a period of 10 year. | |  |  |  |
| 10.14 | External memory card (CF or SD) for storage copies of data from measurement in the period of 10 years. | |  |  |  |
| 10.15 | Housing adopted in a 19” rack | |  |  |  |
| 10.16 | Automatic restart of the device after power supply breakdowns and self-building up in operating mode | |  |  |  |
| 10.17 | **Software:**  Operating system that provides reliable operation and data processing in real time;  Web application to configure the data logger which allows easy management with Data Logger;  SQL data base for storing of the raw and processed data;  Consistency of the data in case of power failures and re-arrivals;  Well known open protocol of the data logger and capability of connection with well-known data collection and data processing software (Air Quality Data Management Systems - Airviro).  Additional functions required:   * The acquisition of measured values on devices; * Data processing of the measurement, aggregation and store in a database; * Generating backup of measured data to an external memory; * Processing error signal (alarm) obtained from measuring devices and generate error reports; * Monitoring of measuring devices and remote access and control devices; * Web configuration of complete station; * A security access control Data Logger-in at the station and via the Internet; * Control of establishing and maintaining VPN connections to the central system; * Automatic mode "update" to the changes in the software and configuration; * E-mail and SMS alert overdraft limits or alarm conditions of the equipment; | |  |  |  |
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| **1. Item Number** | **2. Specifications Required** | | **3. Specifications Offered** | **4.  Notes, remarks,  ref to documentation** | **5. Evaluation Committee’s notes** |
| 11 | **PC (Laptop)** | **Quantity: 1** |  |  |  |
|  | Manufacturer’s name: | |  |  |  |
|  | Product type, model: | |  |  |  |
|  | **Specifications** | |  |  |  |
| 11.1 | **Hardware**   * + CPU: Intel i5 4th generation (or higher)   + RAM: 8 GB (or higher)   + HD: 500GB (or higher)   + Connectivity: LAN, Wi-Fi, Bluetooth   + Display: 15.6" LED 1366x768 (or higher)   + Accessories: 4 USB to RS232 adapters with appropriate driver for installation. | |  |  |  |
| 11.2 | **Software:**   * + **OS:** Windows 10 64 bit or equivalent, capable to run data acquisition software (item 10)   Unlimited duration license(s) for OS provided | |  |  |  |

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| **1. Item Number** | **2. Specifications Required** | | **3. Specifications Offered** | **4.  Notes, remarks,  ref to documentation** | **5. Evaluation Committee’s notes** |
| 12 | **Training for All items** | **Quantity: 1** |  |  |  |
|  | Manufacturer’s name: | |  |  |  |
|  | Product type, model: | |  |  |  |
|  | **Specifications** | |  |  |  |
| 12.1 | * Training for service, maintenance and calibration for all items for 2 persons of the end user for 5 working days. Training should be in English or Macedonian. | |  |  |  |

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| **1. Item Number** | **2. Specifications Required** | | **3. Specifications Offered** | **4.  Notes, remarks,  ref to documentation** | **5. Evaluation Committee’s notes** |
| 13 | **Warranty** | **Quantity: 1** |  |  |  |
| 13.1 | The warranty must remain valid for 12 months after provisional acceptance.  The Supplier shall also provide 20 hours of on-line support via e-mail, phone, Skype, or other suitable communication means during the warranty period. This on-line shall be replied within two working days. | |  |  |  |