

ANNEX II + III: TECHNICAL SPECIFICATIONS + TECHNICAL OFFER

Contract title: Supply of Equipment Necessary for Improving of Conformity Assessment (CA) Services in the Republic of Serbia

1 /26

LOT 7: EQUIPMENT FOR DETERMINATION OF CHEMICAL PROPERTIES OF MATERIALS/PRODUCTS

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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 offered specifications.

Unless otherwise specified, the requirements in these Technical Specifications are presented as a minimum standard which the offered goods must meet.

Unless otherwise stated, the following requirements shall also apply:

A - Documentation

Upon delivery of the goods a technical documentation for equipment (such as instruction manual for the use, maintenance, calibration, etc.), in English shall be provided, unless otherwise stipulated by Serbian technical regulations. If available, an additional manual in the Serbian language would be welcomed.

B - Compliance to safety rules and regulations

When submitting a tender, the tenderer must state expressly that all of the proposed equipment meet the safety requirements of the applicable rules and regulations in force in the Republic of Serbia. Upon delivery, the tendered equipment shall include proof of compliance.

C - Certificate of calibration

The Contractor shall deliver the equipment with the certificates of calibration for the equipment contributing to the uncertainty of the final test result for which they are intended to be used. The certificates of calibration should be issued by an accredited calibration laboratory, unless otherwise specified.

D - Installation

The Contractor shall install the equipment in the premises of the user and demonstrate after the installation of the equipment that it is capable of performing the functions required of it.

E - Training

When applicable, the Contractor shall provide on-the-job training to ensure the correct operation and maintenance of the equipment, at the time of installation, with additional training, to be provided by the Contractor within the following 6-month period. Tenderer shall submit training programme. The length of the training shall be adequate to the technical characteristics and maintenance requirements of the equipment supplied and shall allow the final user to properly handle the instrument(s). The training material must be provided on minimum 1 (one) electronic media and in minimum 1 (one) hard copy per trainee. The training should be in Serbian language (or interpretation must be provided by the supplier). The performance of the equipment against the required technical specifications shall be verified as part of the training.

F - Warranty

The Contractor shall provide a warranty for the equipment supplied in line with the Special Conditions. This warranty shall remain valid for one year after provisional acceptance.

G - Commercial Warranty

Commercial warranty must remain valid for two years (after the end of one year standard warranty) in accordance with the conditions laid down in Article 32 of the Special and General Conditions. Tenderer must provide a detailed description of the organisation of the proposed service.

LOT 7: EQUIPMENT FOR DETERMINATION OF CHEMICAL PROPERTIES OF MATERIALS/PRODUCTS

1. Item Number	2. Specifications Required	3. Specifications Offered	4. Notes, remarks, ref to documentation	5. Evaluation Committee's notes
1	ANALYSERS OF DIESEL FUELS AND GASOLINE AND GASOLINE BLEND STREAMS CONTENT			
	Manufacturers name:			
	Product model:			
	<p>This item is composed of two parts of equipment:</p> <p>PART 1. LABORATORY ANALYSER OF DIESEL FUELS</p> <p>QUANTITY: 1</p> <p>The equipment is able to perform tests according to the following standards: ASTM D7668:2014a, ASTM D613-05</p> <p>Intended use: Equipment for the determination of derived Cetane number (DCN) of Diesel Fuel oils according to the requirements of the above mentioned standard</p> <p>The equipment shall also meet the minimum following requirements: - Multi point detection system: both ID and CD detections</p>			

	<ul style="list-style-type: none"> - Use of common rail diesel engine injection systems - Able to measure FAME, GTL, BTL, HVO - Able to differentiate non-improved diesel fuels and Cetane improvers present in diesel fuels in concentrations as low as 200 to 800 ppm - Fully automatic equipment using "one-key" solution, for processing the analysis; and automatic calibration - Power supply: 220-230 V - 50 Hz. <p>The following additional requirements apply:</p>				
	A – Documentation				
	B - Compliance to safety rules and regulations				
	C - Certificate of calibration				
	D – Installation				
	E – Training	Number of persons to be trained: 4			
		Duration: minimum 3 (three) working days			
	F – Warranty				
	G - Commercial Warranty				
	<p>PART 2. REFORMULYSER FOR GASOLINE AND GASOLINE BLEND CONTENT ANALYSIS</p> <p>QUANTITY: 1</p> <p>The equipment is able to perform tests according to the following standards: ASTM D5443 (reapproved 1998), ASTM D6839-13, EN ISO 22854: 2014, IP566.</p>				

	<p>Intended use: Equipment for analysis of gasoline and gasoline blend steams contents according to the above mentioned standards methods</p> <p>The equipment shall also meet the minimum following requirements:</p> <ul style="list-style-type: none"> - Able to analyze hydrocarbon content (olefins & aromatics), benzene, oxygenates and oxygen contents - Use of multi-dimensional gas chromatography technology <ul style="list-style-type: none"> - Gasoline analysis time <40 minutes - Gas carrier: Nitrogen - Power supply: 220-230 V - 50 Hz. <p>The following additional requirements apply:</p>				
	A – Documentation				
	B - Compliance to safety rules and regulations				
	C - Certificate of calibration				
	D – Installation				
	E – Training	Number of persons to be trained: 4			
		Duration: minimum 3 (three) working days			
	F – Warranty				
	G - Commercial Warranty				
2	FLASH POINT TESTER				
	QUANTITY: 1				
	Manufacturers name:				
	Product model:				
	The equipment is able to perform tests according to the following standards:				

	<p>EN ISO 2719: Determination of flash point -- Pensky-Martens closed cup method.</p> <p>Intended use: Pensky-Martens closed cup EN ISO 2719 (Determination of flash point. Pensky-Martens closed cup method).</p> <p>Automatic Pensky-Martens flash point tester:</p> <ul style="list-style-type: none"> - Test temperatures: <ul style="list-style-type: none"> o Diesel fuel flash points between 52 and 96 °C, o jet fuel flash points between 38 and 66 °C. - Gas ignition - Cooling fan - Electric stirrer - Automatic test capability - Electric sample heating with automatic control - Digital temperature display <p>Power supply: 220-230 V / 50 Hz.</p> <p>The following additional requirements apply:</p>				
	A – Documentation				
	B - Compliance to safety rules and regulations				
	C - Certificate of calibration				
	E- Training	Number of persons to be trained: 4			
		Duration: minimum 2 (two) working days			
	F – Warranty				
	G - Commercial Warranty				
3	<p>AAS-ATOMIC ABSORPTION SPECTROMETER</p> <p>QUANTITY: 1</p>				

	Manufacturers name:			
	Product model:			
	<p>Analyses according to EPA (Environmental Protection Agency) methods by atomic absorption spectrometry:</p> <p>EPA 220.1:1978: Copper (Atomic Absorption, Direct Aspiration)</p> <p>EPA 236.1:1978: Iron (Atomic Absorption, Direct Aspiration)</p> <p>EPA 249.1:1978: Nickel (Atomic Absorption, Direct Aspiration)</p> <p>EPA 213.1:1974: Cadmium (Atomic Absorption, Direct Aspiration)</p> <p>EPA 218.1:1978: Chromium (Atomic Absorption, Direct Aspiration)</p> <p>EPA 239.1:1978: Lead (Atomic Absorption, Direct Aspiration)</p> <p>EPA 289.1:1974: Zinc (Atomic Absorption, Direct Aspiration)</p> <p>EPA 204.1:1978: Antimony (Atomic Absorption, Direct Aspiration)</p> <p>EPA 243.1:1978: Manganese (Atomic Absorption, Direct Aspiration)</p> <p>and also EN 14385: Stationary source emissions - Determination of the total emission of As, Cd, Cr, Co, Cu, Mn, Ni, Pb, Sb, TI and V</p> <p>Intended use: analysis of the concentration of heavy metals in different matrices such as stack gas particulates, stack gas impinger solutions,</p>			

	<p>water samples (groundwater, surface water and waste water), soil.</p> <p>Atomic absorption spectrophotometer, double beam:</p> <ul style="list-style-type: none"> - Flame burner system - Graphite furnace - Double beam for flame operation, single-beam with Zeeman background correction for furnace operation. - Autosampler with ≥ 200, sample position manual or fully automatic photometer settings (wavelength, slit width, etc.) - Wavelength range: 185 - 900 nm. - Czerny-Turner monochromator with $\leq \pm 0.04$ nm repeatability. - At least 6-lamps holder. <p>Hollow cathode lamps or high energy lamps: 2 for each element</p> <ul style="list-style-type: none"> - Ag (Silver), Al (Aluminium), As (Arsenic), Be (Beryllium), Ba (Barium), Ca (Calcium), Cd (Cadmium), Co (Cobalt), Cr (Chromium), Cu (Copper), Fe (Iron), Hg (Mercury), Mg (Magnesium), Mn (Manganese), Mo (Molybdenum), Na (Sodium), Ni (Nickel), Pb (Lead), Sb (Antimony), Se (Selenium), Sr (Strontium), Zn (Zinc). <p><i>Flame burner system</i></p> <ul style="list-style-type: none"> - Flame system: both manual and computer-controlled with oxidant and fuel monitoring compatible with both air/acetylene and nitrous-oxide/acetylene - Safety interlocks should include but not necessarily be limited to the following: burner 			
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	<p>type, burner correctly fitted, liquid trap full, flame sensor, flame shield in place, oxidant pressure, and mains power.</p> <ul style="list-style-type: none"> - Automatic changeover between air and nitrous oxide flames. - Flame performance: <ul style="list-style-type: none"> ○ A minimum absorbance of 0.55 is required from a 5mg/L copper standard using an air-acetylene flame aspirated at 5.0 mL/min. ○ The percent relative standard deviation (%RSD) from ten 5-second integrations must be equal to or better than 0.5% for a 5mg/L copper solution aspirating at 5.0 mL/min. - Sample Introduction and Dilution System for Flame AAS: <ul style="list-style-type: none"> ○ A precision sample introduction and dilution accessory for use with flame analysis is required. ○ The sample introduction system must be compatible with either manual or automatic sampling using a flame or vapour autosampler. ○ The accessory must be capable of on-line calibration from a single standard and on-line dilution of over range samples. ○ The sample diluter system must be able to prepare a concentration calibration from a single standard. ○ Samples requiring greater than 1:50 dilution must be flagged to highlight a possible loss of accuracy. <p><i>Graphite furnace system</i> Equipped with fully computer-controlled graphite atomizer programmable with at least 10 independently programmable steps, - Parameters to include holding time: 0 to 99 s in steps of 1s</p>			
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	<ul style="list-style-type: none"> - Temperature: programmable to $\geq 2,500$ °C in steps of 10°C - Equipped with recirculation water cooling system - Graphite tube enclosed in an inert gas atmosphere with thermal protection against overheating of the furnace. - Zeeman background correction <ul style="list-style-type: none"> o Background correction range 190 – 400 nm to total 2.5 absorbance. <p>Autosampler, for 50 x 2 ml vials with automatic rinse of the capillary after each injection.</p> <ul style="list-style-type: none"> - Software controlled. <p><i>Calibration standard mixtures (at least 500 ml of each)- with calibration certificate for each</i></p> <p>Multi element standard mixture of known concentration which consists of the following elements:</p> <p>Ag (Silver), Al (Aluminium), As (Arsenic), Be (Beryllium), Ba (Barium), Ca (Calcium), Cd (Cadmium), Co (Cobalt), Cr (Chromium), Cu (Copper), Fe (Iron), Hg (Mercury), Mg (Magnesium), Mn (Manganese), Mo (Molybdenum), Na (Sodium), Ni (Nickel), Pb (Lead), Sb (Antimony), Se (Selenium), Sr (Strontium), Zn (Zinc).</p> <p>PC with necessary connections and software to control the equipment, high-resolution colour monitor and colour laser printer with speed of printing ≥ 6 ppm with A4 sized paper. Resolution of the printer should be minimum 600 dpi.</p> <p>System Software:</p>			
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	<ul style="list-style-type: none"> - Instrument must include system software for multi-element operation in flame, furnace and vapour AAS modes. - Must provide access to third party software applications such as spreadsheets and word processors. - Quality Control Protocols software must be valid in flame, graphite furnace and vapour modes and should conform to international standards. - Automatic over range sample dilution must be available for flame, vapour and graphite furnace operation. - A windowed user-interface is required which guides the analyst through logical events to complete the analysis. - Major instrument functions such as 'Start Autorun', Read, Stop, etc. should be displayed on-screen. - There must be simultaneous display of signal graphics, calibration graphics and current method summary. - Previous results of an automatic run should be available on-screen while an analysis is in progress. - The system software must include system password management including protection against modification and deletion of datasets, methods and sequences. - Data must be stored in both peak height and area to optimize the measurement mode. - The number of replicates must be selectable for both standards and samples. - Current solution/sample label must be indicated on-screen - Calibration with up to 10 standards in both normal calibration and standard addition modes is required. 			
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	<ul style="list-style-type: none"> - Standards should be selectable on a method basis. - System must provide a choice of least squares fit algorithms including quadratic and linear. - Available calibration goodness of fit diagnostics must include slope, X and Y intercepts, correlation coefficients and residuals. - All stored graphics must be identified by their sample or solution label to meet ISO/IEC 17025 chain of custody requirements. - All raw data that instrument measures and transfers to the computer, methods of acquisition and calibration data must be stored on computer that controls the instrument and these options must be provided by instrument manufacturer's software. - Data quality control software must be provided for flame, vapour and furnace AA with the following available options: recalibrate and repeat, retry/flag and continue, reslope and repeat. <p>Power supply: 220-230 V - 50 Hz with electrical protection against overvoltage</p> <p>The Tenderer shall provide training for two people in the use and application of the equipment.</p> <ul style="list-style-type: none"> - Installation and start-up: <ul style="list-style-type: none"> o Copper tubing, nuts, ferrules, fuses and septa. o Communication cable. o All connections between gas pressure tanks and the instrument are to be provided. o Pressure regulators for AAS and GFAA shall be provided. - Analysts shall be trained on the use of the machine on-site. <p>The following additional requirements apply:</p>			
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	A – Documentation				
	B - Compliance to safety rules and regulations				
	C - Certificate of calibration				
	D – Installation				
	E – Training	The training will include setup and commissioning of the equipment as well as instruction on how to calibrate it. The instruction will address how to use the instrument in standard methods of analysis. Training to be completed within four weeks of commissioning of the equipment.			
		Number of persons to be trained:2			
		Duration: minimum 3 (three) working days			
	F – Warranty				
	G - Commercial Warranty				
4	GAS CHROMATOGRAPH - TRIPLE QUADRUPOLE MASS SPECTROMETER				
	QUANTITY: 1				
	Manufacturers name:				
	Product model:				
	The needed equipment shall be completed with auto-sampler, fitted with a split/splitless capillary injector and a mass selective detector supplied with a PC and Windows™ based software to control the operation of the gas chromatograph and for the acquisition and processing of data, together with a Laser printer. Supplied with a NIST or				

	<p>equivalent spectral library for compound identification.</p> <p>Intended use: determination of organic pollutants in different matrices according to following methods:</p> <ul style="list-style-type: none"> - EPA 8270: Semi volatile Organic Compounds By Gas Chromatography/Mass Spectrometry (GC/MS) - EPA 8260: Volatile Organic Compounds By Gas Chromatography/Mass Spectrometry (GC/MS) - EPA 5021A: Volatile Organic Compounds In Various Sample Matrices Using Equilibrium Headspace Analysis - EPA 8015D: Nonhalogenated Organics Using GC/Fid - NIOSH 1300: Ketones I 1300 - NIOSH 1457: Ethyl Acetate 1457 - NIOSH 1450: Esters I 1450 - ASTM D 4413: Standard Test Method For Determination Of Ethylene Oxide In Workplace Atmospheres (Charcoal Tube Methodology) - NIOSH 1022: Trichloroethylene 1022 - NIOSH 1603: Acetic Acid 1603 - NIOSH 2537: Methyl And Ethyl Methacrylate 2537 - NIOSH 1500: Hydrocarbons, BP 36°-216 °C - NIOSH 1501: Hydrocarbons, Aromatic 1501 - EN 13649: Stationary Source Emissions - Determination Of The Mass Concentration Of Individual Gaseous Organic Compounds - Activated Carbon And Solvent Desorption Method - ISO 11338: Stationary Source Emissions Determination Of Gas And Particle-Phase Polycyclic Aromatic Hydrocarbons 			
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	<p>Quadrupole Analyzer:</p> <ul style="list-style-type: none"> - Tandem triple quadrupole analyzer - Mass range: 4-1500amu <p>Comprising:</p> <ul style="list-style-type: none"> - Two high resolution quadrupole analyzers - Two Pre filters <p>Collision cell:</p> <ul style="list-style-type: none"> - Collision cell with beam focusing - Ion Source: <ul style="list-style-type: none"> o EI (electron Impact) Ionization o Standard EI mode upgradable to CI mode. - Detector: <ul style="list-style-type: none"> o Photomultiplier detection system with long-term gain stability. - Vacuum system: <ul style="list-style-type: none"> o Air cooled turbo molecular pump o The vacuum system must allow exchange of GC columns without the need to vent the MS and incorporate a high efficiency pump to ensure high abundance sensitivity in the analyzer region. o Monitoring of vacuum and protection should be fully automatic and computer controlled. <p>Scan function:</p> <ul style="list-style-type: none"> - Mass scanning, - MS/MS precursors (parents), MS/MS daughter, MS/MS neutral, MS/MS MRM (Multiple Reaction Monitoring) - EI Multiple Reaction Monitoring (MRM) <p>Sensitivity:</p> <ul style="list-style-type: none"> o Must be able to produce $\geq 10000:1$ S/N at nominal m/z 272 ion by injection of 100 fg of octafluoronaphthalene (OFN) for the transition from m/z 272 to m/z 222 <ul style="list-style-type: none"> - Mass range: from 10 to >1,000 amu 			
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	<p>Instrument Control and Data Processing:</p> <ul style="list-style-type: none"> - Equipment software to control the instrument and provide data handling capability. - Software must be able to automatically take the spectral data and search through multiple libraries of mass spectra, locating and ranking those spectra which show the best correlation. This function should be usable to identify true unknowns through commercial libraries. - Tuning Utilities (Auto and manual tuning) - Software for automatic Quality Control (QC) and Confirmatory Checks - NIST library, or similar - Suitable PC with installed software and laser printer with A4 sized paper. - The software must include functions for analytical methods compliance with US EPA and corresponding European methods. <p>Gas Chromatography.</p> <ul style="list-style-type: none"> - Gas Chromatograph (GC) with split/splitless injector capable of accepting large volumes up to 200 µL - Autoinjector with at least 80 sample tray. - Built-in microprocessor, controlling all gas-flow channels for detectors, injectors with electronic pressure control system - Column oven fully programmable for up to, at least, 450 °C with at least 5 programming steps, with programmable rate setting up to 100 °C/min in 1 °C/min steps. Overheating protection. - Cooling speed: at least 60 °C/min - Split/splitless capillary injector able to accept in the same oven a second injector for simultaneous injection and analysis of the same sample on 2 different columns - The injector should provide for the possibility of large volume injections up to 200 µL. 			
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	<ul style="list-style-type: none"> - Injectors must feature purge system and electronic pressure control of the column back-pressure, with multi-linear pressure programming up to 100 psi in increments of 0.001 psi and programmable split ratio control. Temperature programming must be available with ≥ 10 ramps with a heating rate of ≥ 100 °C/min. - Injector port temperature programmable from ambient to 400 °C in 1 °C increments - Back flush option for reversing column flow to reduce contamination of the column system while shortening cycle times. <p>Auto-sampler/Auto-injector:</p> <ul style="list-style-type: none"> - Injection volume: 0.1 to 250 µL <ul style="list-style-type: none"> o Precision: better than 0,5% o Sample capacity ≥ 150 samples o Injection volume range: $\leq 0.1 - \geq 250$ µl o Sampling depth should be variable. <p>Flame ionization detector:</p> <ul style="list-style-type: none"> - Optimized for capillary columns - Electronic pressure/flow control - Maximum operating temperature: at least 400 °C - Automatic ignition - Flame-out detection - Detection limit: ≤ 1.4pg Carbon/sec as propane using N₂ as carrier - Dynamic range: $\geq 10^7$ using N₂ as carrier. <p>Headspace analyser:</p> <ul style="list-style-type: none"> - Equipped with a sample tray for at least 100 samples - Heating oven with ≥ 12 positions - Oven temperature: 40 – 200 °C - Valve and loop temperature: 40 – 200 °C - Transfer line temperature: 40 – 250 °C 			
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	<ul style="list-style-type: none"> - Sampling modes: Single Extraction, Multiple Headspace Extraction, Method Development mode - Sampling technique: 1 mL sample loop with completely inert sample pathway - Sampling repeats: ≥ 15 - Software for the control of the unit should be incorporated with GC-QQQ software and all method parameters should be stored within one method for GC-QQQ and headspace sampler. <p>Accessories:</p> <ul style="list-style-type: none"> - 1 cylinder Ultra High purity He gas 99,999%, Cylinder, with Regulator, Tubing suitable for use with high purity He - Gas supply system must be supplied with all needed accessories such as tubing, connections, valves necessary to connect the Helium gas cylinder to the Gas Chromatograph unit - Connector, Reducer - 1 cyl - Nitrogen Gas 99,999%, Cylinder, regulator, connector, tubing, reducer - 1 cyl - GC/MS Helium Gas Filter Cartridge - 2 pkgs - Graphite Ferrule 10/pk for MS - 2 pkgs - Graphite Ferrule 10/pk for Injector - 2 pkgs - Vial & septa 100/pk - 1 pce FID Flame Ionization detector with electronic pneumatics control optimized for capillary columns only, monitored as an analogue channel - 1 pkg - Spare parts - Basic spares and Tool kit - Inst/Oil/Filter kit - Fuse kit - Pump Kit - EI Inner Source Spares Kit - Three capillary columns: 			
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	<ul style="list-style-type: none"> ○ Two capillary columns with 5%-phenylmethylpolysiloxane, or equivalent, stationary phase with id 0.25 mm, film 0.25 µm and length 30 m ○ One capillary column with polyethylene glycol (PEG) stationary phase with id 0.25 mm, film 0.25 µm and length 30 m. <p>Provided with:</p> <p>Power supply 220-230 V – 50 Hz.</p> <p>The following additional requirements apply:</p>				
	A – Documentation				
	B - Compliance to safety rules and regulations				
	C - Certificate of calibration				
	D – Installation				
	E – Training	Number of persons to be trained: 2			
		Duration: minimum 1 (one) working day			
	F – Warranty				
	G - Commercial Warranty				
5	FTIR GAS ANALYZER QUANTITY: 1				
	Manufacturers name:				
	Product model:				
	The equipment is able to perform tests according to the following standards: EN 14789-2005: Stationary source emissions - Determination of volume concentration of oxygen (O2) - Reference method - Paramagnetism				

	<p>ISO 16911-1 – 2013: Stationary source emissions – Manual and automatic determination of velocity and volume flow rate in ducts – Part 1: Manual reference method.</p> <p>Intended use: measurement of parameters of waste gas in situ.</p> <p>Multicomponent FTIR Gas Analyzer.</p> <p>Instrument should be able to quantify at least the following compounds in high (up to 50%) and low concentrations (up to 100 ppm): water, pentane, carbon disulphide, carbon tetrachloride, carbon dioxide, carbon monoxide, nitrogen monoxide, nitrogen dioxide, nitrogen suboxide (N₂O) sulfur dioxide, ammonia, hydrogen chloride, hydrogen difluoride, ethylene oxide, methane, ethane, propane, butane, formaldehyde, hydrogen cyanide, carbonyl sulfide, hexane, methanol, ethylene.</p> <ul style="list-style-type: none"> - Measuring principle: Fourier transform infrared, FTIR. - Maximum stack gas temperature 180°C. - Flow rate of entire system 120 - 600 liters per hour. - Sample gas pressure should be ambient. - Flow rate of entire system 120 - 600 liters per hour. - Performance: Simultaneous analysis of up to 50 gas compounds. - Sample cell: fixed or adjustable path length. - Response time: < 120 s. - Resolution of the spectrometer 4 - 8 cm⁻¹. - Scan frequency: 10 scans/s. - Wave number range: 900 - 4200 cm⁻¹. - Zero point drift < 2 % of measuring range per zero point calibration interval 			
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	<ul style="list-style-type: none"> - Sample cell temperature: $\leq 180^{\circ}\text{C}$ - Linearity deviation: $< 2\%$ of measuring range ($< 1\%$ for oxygen). - Temperature drifts: $< 2\%$ of measuring range per 10K temperature change - Gas filtration: filtration of particulates ($2\text{ }\mu\text{m}$) required - FTIR analyser should be equipped with a laptop computer and Windows™ based software for control of the instrument and data analysis Also, a wheeled cart should be supplied for transportation of the equipment. <p>Power supply: 220-230 V - 50 Hz.</p> <p>The following additional requirements apply:</p>				
	A – Documentation				
	B - Compliance to safety rules and regulations				
	C - Certificate of calibration				
	E- Training	Number of persons to be trained: 3			
		Duration: minimum 2 (two) working days			
	F – Warranty				
	G - Commercial Warranty				
6	AUTOMATIC ISOKINETIC SAMPLER				
	QUANTITY: 1				
	Manufacturers name:				
	Product model:				
	<p>The equipment is able to perform tests according to the following standards:</p> <p>EN 13284-1: 2009, ISO 9096: 2006, and</p>				

	<p>ISO 12141: 2002, ISO 16911-1:2013, EN 13211:2001, EN 14385:2004, EN 1911:2010, EN 14791:2005.</p> <p>Intended use: Measurement of dust and heavy metals particles according to the above mentioned test methods:</p> <p>The equipment shall also meet the minimum following requirements:</p> <ul style="list-style-type: none"> - Dust and heavy metal sampling line (big sampling line) - Dust ranges: < 50 mg/m³ and 50 to 2000 mg/m³ - Suction tube length: 3000 mm with bypass - Suction line including: a isokinetic control unit, drying tower, pressure gauge, probe, S-Pitot tube in stainless steel, heated out stack filter, thimble holder, and digital pressure indicator integrated in the control unit, the pump of the isokinetic control unit having a flow rate up to at least 50 l/min - Power supply: 220-230 V-50 Hz. <p>The following additional requirements apply:</p>				
	A – Documentation				
	B - Compliance to safety rules and regulations				
	C - Certificate of calibration	<p>The equipment shall be supplied with calibration certificates for the instruments measuring:</p> <ul style="list-style-type: none"> - The flow produced by the pump, - The differential pressure, - The Pitot tube, 			

		<ul style="list-style-type: none"> - The flow through dust measurement probe, - The temperature of sampling line including temperature of out stack filter holder. 			
	D – Installation				
	E – Training	Number of persons to be trained: 3			
		Duration: minimum 1 (one) working day			
	F – Warranty				
	G - Commercial Warranty				
7	CARBON AND SULFUR IN STEEL ANALYZER QUANTITY: 1				
	Manufacturers name:				
	Product model:				
	<p>The equipment is able to perform tests according to the following standard:</p> <p>EN ISO 1535: Steel and iron — Determination of total carbon and sulfur content — Infrared absorption method after combustion in an induction furnace.</p> <p>The instrument system consists of three subsystems: measurement unit, induction furnace and control console.</p> <ul style="list-style-type: none"> - Instrument range: Carbon: up to at least 6% , Sulfur: up to at least 0.5% - Sensitivity: 0,1 ppm (or better) - Accuracy: carbon: +/- 10 ppm, Sulfur +/- 30 ppm (or better). - Sample mass: approx. 1 g. - Analysis time: 60 sec. (or better). 				

	<ul style="list-style-type: none"> - Induction furnace power: <ul style="list-style-type: none"> o at least 2300 W o induction furnace frequency: approx. 19 to 20 MHz o Automatic cleaning mechanism. - Oxygen gas purifying unit. - PC with necessary connections and software to control the equipment, color screen, color laser printer. <ul style="list-style-type: none"> o The software must provide for recall of analytical parameters, results, statistics and calibration data. o Hard drive \geq 500 GB, DVD drive, 2 serial ports RS232., USB connector, Gigabit LAN port. - Repeatability: <ul style="list-style-type: none"> o Carbon: \pm 2 ppm or 2.0 % RSD (whichever is greater) o Sulfur: \pm 4 ppm or 3.0 % RSD (whichever is greater) - Power supply: 220-230 V - 50 Hz. <p>Infrared absorption method after combustion in an induction furnace.</p> <p>The following additional requirements apply:</p>			
	A – Documentation			
	B - Compliance to safety rules and regulations			
	F – Warranty			
	G - Commercial Warranty			
8	UV-Vis SPECTROPHOTOMETER QUANTITY: 1			
	Manufacturers name:			
	Product model:			

	<p>The equipment is able to perform tests according to the following standard: EN 196-10: Methods of testing cement - Part 10: Determination of the water-soluble chromium (VI) content of cement.</p> <p>Intended use: Solution analysis. In acid solution, chromium (VI) forms a red-violet complex with the reagent and its absorption/colour is measured using a visible light spectrophotometer set at a wavelength of 540 nm.</p> <ul style="list-style-type: none"> - Source lamps: Tungsten and/or halogen and/or pulsed xenon (visible range) and/or, deuterium (UV range) dual beam system with matched silicon diode detectors. - Capable of operating in the wavelength range 190 - 1100 nm - Wavelength accuracy: ± 1 nm at wavelength 540 nm. Accuracy ± 0.5 nm at 541.9 nm and reproducibility of ± 0.1 nm - Photometric noise, 500 nm, 1 sec. signal averaging time: at 1 abs < 0.004 A RMS; at 2 abs < 0.005 A RMS - Baseline flatness from 200 to 850 nm, corrected: ± 0.001 - Bandwidth ≤ 4 nm - mode options of absorbance, transmittance or concentration - Photometric range ≤ -0.3 to ≥ 2.5 A, 0 to ≥ 130 % T, 0 – 9,999 C <p>Power supply 220-230 V – 50 Hz.</p> <p>The following additional requirements apply:</p>			
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	A – Documentation				
	B - Compliance to safety rules and regulations				
	C - Certificate of calibration				
	E- Training	Number of persons to be trained: 2			
		Duration: minimum 1 (one) working day			
	F – Warranty				
	G - Commercial Warranty				