

305/F2/149 IM**Zestaw analizatorów do pomiaru emisji spalin z silnika na hamowni silnikowej****Emissions system for emission measurement of exhaust gases from engine on the engine test bench**

CPV 38433200-1, 38540000-2, 38545000-7

**SPECIFICATION of ESSENTIAL CONDITIONS
of the SCOPE of ORDER (SEC)****OPEN TENDERING PROCEDURE
REFERRING TO PUBLIC PROCUREMENT LAW**

(ACT of 29 January 2004 PUBLIC PROCUREMENT LAW).

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§1. INTRODUCTION

1. The item of order is a system designed for research and development and homologation activities in the range of emission testing of engines fuelled with gasoline, Diesel, LPG, CNG, synthetic fuels and biofuels on the engine test benches.
2. The system must be designed to be fully integrated into BOSMAL's existing test benches automation systems. The item of order is destined for use in homologation activities, and thus the system should conform to all relevant requirements of ECE EURO 5/EURO 6, US EPA CFR 1065/CARB. The ability of BOSMAL's existing test benches automation systems to meet ECE, US EPA/CARB standards must not be compromised in any way by the installation of the item of order.
3. The emission system should facilitate the execution of the following tests of engines on an engine dynamometer:
 - a) Continuous measurement of undiluted exhaust before and after various elements of the engine's aftertreatment devices (DOC, DPF/POC, SCR, NH₃ slip cat, etc) and analysis of CO₂ concentrations downstream of the engine's EGR valve at ambient temperatures 20 °C - 30 °C, during emissions tests according to ECE, and US EPA/CARB standards;
 - b) Calculation of lambda value and EGR ratio during any type of emissions testing activity or homologation cycle.
4. The emission system should be designed, manufactured and installed for continuous operation (7/24), and the system's assumed life time should be at least 10 years.

§2. THE ITEM OF ORDER DESCRIPTION

A INTRODUCTION

1. The item of order is a new exhaust emission measurement system, suitable for homologation and certification according to current HD ECE and US legislation as well as for engine R&D on two engine test benches based on two different automation systems with the possibility to employ all of the following configurations:
 - a). Line 1 - AVL PUMA 1.5.1 (or 1.3.2) and Line 2 - HORIBA STARS,
 - b). Both lines - AVL PUMA 1.5.1 (or 1.3.2),

c). Both lines - HORIBA STARS.

2. The item of order should be a system with two main lines + separated EGR line + separated NH₃ line, consisting of the following elements:

2.1. Two heated sampling lines with heated, switchable pre-filters for sampling of exhaust gases both upstream of any type of aftertreatment device ('Pre-cat') and downstream of the aftertreatment device ('Post-cat'); with analysers for the following compounds:

CO, CO₂, THC, CH₄ (NMHC calculated), NO, NO₂, NO_x, O₂.

For one of these lines only: N₂O.

Measurement with the 2 lines at the same sample point should bring the results within 1 % of the measuring value for each gas compound.

2.2. One sampling line and analyser for quantification of the exhaust gas recirculation (EGR) ratio via measurement of CO₂; this EGR analyser must be switchable so that it can communicate with multiple test automation systems (to be paired with one of the sampling lines mentioned in point 1).

2.3. A portable, stand-alone NH₃ analyser unit with heated sampling system consisting of heated pre-filter for quantification of ammonia emissions downstream of SCR devices (to be paired with one of the sampling lines mentioned in point 1).

2.4. Full mechanical and electronic integration into BOSMAL's existing AVL and HORIBA automation systems and all pertinent media supply systems. This integration must include the supply, set-up, installation and start-up of all required computer hardware and software, including total integration of all computers into BOSMAL's existing control software. The BOSMAL's automation systems have only the drivers for AVL CEB II and HORIBA MEXA-7000.

2.5. A warranty agreement covering a period of at least three years, in the range of routine maintenance of the system, all types of troubleshooting and repairs, spare parts, and all related costs.

B GENERAL DESCRIPTION

1. A multiple sampling line emissions testing system dedicated to continuous measurement of undiluted exhaust gases before and after various aftertreatment devices.

1.1. Two measuring lines dedicated to continuous measurement of undiluted exhaust before and after various aftertreatment devices, with the measuring ranges given below (with a suitable number of ranges between low and high range, in order to cover a wide range of engine types and emission levels):

Quantity	Analyser (Operating principle)	Measuring range	
		Low	High
2	CO low (NDIR)	0-50 ppm	0-5000 ppm
2	CO high (NDIR)	0-0.5 %	0-10 %
2	CO ₂ (NDIR)	0-0.5 %	0-20 %
2	O ₂ (PMD)	0-1 %	0-25 %
1	N ₂ O	0-100 ppm	0-1000 ppm
2	NO – NO ₂ (CLD)	0-10 ppm	0-10000 ppm
2	NO _x (CLD)	0-10 ppm	0-10000 ppm
2	THC (FID)	0-10 ppm C1	0-20000 ppm C1
2	CH ₄ (FID)	0-10 ppm C1	0-20000 ppm C1

1.1.1. A measuring line with CO₂ EGR analyzer, with the measuring range given below:

Quantity	Measured component (Analyzer)	Measuring range	
		Low	High
1	CO ₂ (NDIR)	0-0.5 %	0-20 %

1.1.2. A measuring line with NH₃ analyzer, with the measuring range given below:

Quantity	Measured component (Analyzer)	Measuring range	
		Low	High
1	NH ₃ (LDD)	0-100 ppm	0-5000 ppm

1.2. All implemented analysers must fulfil the requirements of all relevant ECE and EPA/CARB legislation, including the following parameters:

- Rise time (t_{10-90}) and Fall time (t_{90-10}),
- Accuracy,
- Linearity,
- Repeatability,
- Noise,
- NO/NO_x quenching < 1% - as it is strongly recommended by US EPA.

- 1.3. The analyser units should be equipped with all necessary operational valves, pumps and pipes for span and operation gases which permit the execution of emission tests and the performance of at least following functions: analyzer calibration, performing linearizations and linearization checks, efficiency testing of the NO_x converter, checking of the FID analyzer's hydrocarbon response and O₂ interference, interference check of NDIR analyzers, leak check, drift and other checks, as required by emissions legislation. All internal piping and components which come into contact with exhaust gases should be made of stainless steel or PTFE.
- 1.4. The analysis system must be equipped with a controlling computer (with monitor), which permits control and operation of all installed analyzers (excluding the NH₃ analyser – for the NH₃ analyser see point 1.5). The installed software (in English) should permit the execution of at least the following functions: automatic and manual calibration and calibration check (zero-span), automatic linearization and linearization check using a gas divider. Additionally, the software should permit the execution of the following checks: leak check of the system and sampling lines, efficiency test of the NO_x converter, checking FID analyzer hydrocarbon response, interference check of NDIR analyzers, and other checks required by emissions legislation. The system may feature, if available, a function permitting remote error diagnosis and troubleshooting via an internet connection.
- 1.5. For the NH₃ analyser the controlling computer must be able to act as a stand-alone unit. This computer must also be able to be connected to the controlling computer for the main analyzer rack or directly to the BOSMAL's existing automation system (to be paired with one of the sampling lines as mentioned above in §2.A.1)
- 1.6. Two sampling lines (heated 190±10°C) for continuous undiluted exhaust measurement before and after the aftertreatment devices, total lengths of 16 m. One sampling line (temperature controlled 190±10°C) for EGR measurement, length of 16 m (lengths of heated lines are according to the system lay-out). Sampling line lengths must cover all possibilities for measuring emissions in any one of BOSMAL's test cells, and the adjacent three test cells, as shown in Appendix 4 - page 2.
- 1.7. Two heated, switchable pre-filters, designed to eliminate the formation of condensation in the system. Each pre-filter must be equipped with two inlets, each connected to a two-metre length of heated tubing. The filters' line selector switch should be controlled by the automation software. One heated pre-filter for EGR measurement, equipped with one inlet.
- 1.8. One heated pre-filter, designed to eliminate the formation of condensation in the system, for use with the NH₃ analyser. This filter should be equipped with a single inlet, and need not be switchable. The heated sampling lines connected to the input and output sides of this filter should both be the correct length to fulfil the demands of all relevant ECE and EPA/CARB

legislation and should ensure easy connection to the exhaust line.

2. The analyser's automation system software programme must automate various functions of the item of order, specifically the automated execution of:
 - calibration of analyzers before a test commencing,
 - measurement of undiluted exhaust before and after aftertreatment devices,
 - continuous calculation of the EGR ratio,
 - continuous calculation of the A/F ratio and derived λ value,
 - archival of all the above-mentioned parameters at a frequency of at least 10 Hz,
 - pre-warning for maintenance,
 - graphical trend analysis of the results,
 - monitoring of analyser calibration results.
3. The time offset of each compound analysed must meet the demands of all relevant ECE and EPA/CARB legislation. The offset time must be easily adjustable.

C INSTALLATION AND ACCEPTANCE

1. The Supplier will make a design on the system element layout after signing the contract, which will be presented to BOSMAL for acceptance. Deadline: 1 month after signing the contract.
2. After signing the contract, the kick-off meeting will take place at BOSMAL to agree the action schedule.
3. The Supplier shall provide a list of recommended zero, span and operation gases in advance, which BOSMAL will ensure the availability of for commissioning tests.
4. After system production, just before dispatching, the Supplier will inform BOSMAL of their readiness.
5. In the scope of acceptance at least following tests will be carried out:
 - 5.1. Linearization and linearization check of installed analyzers (minimum 11 dividing points),
 - 5.2. CLD analyzer converter efficiency,
 - 5.3. Interference of NDIR analyzers,
 - 5.4. FID analyzers hydrocarbon response,
 - 5.5. Leak check of sampling lines,

5.6. Acceptance tests (transient) according to ECE and EPA legislation.

6. Media parameters from BOSMAL side are following: power supply 400 V +/-5%, 230 V +/-5%, compressed air: 8 bar.
7. The scope of delivery of the system should include system documentation, in English (1 paper copy and electronic version on CD), consisting of at least:
- System technical drawings;
 - Schematics of all gas, pneumatic and hydraulic components;
 - Schematics of all electric components and connections with description of usage codes;
 - Operation, repair and maintenance manuals including a description of: measurement execution procedures, calibration procedures, functions of system components and software.
 - Spare parts list;
 - Spare parts list, which BOSMAL should have in stock to minimize downtime in the case of system breakdown to not longer than 48 hours;
 - Reports from analyzer checks after start-up at the Supplier's side;
 - A declaration of conformity according to ECE and EPA/CARB legislation;
 - Declarations of conformity according to at least the following safety standards:
 - 2006/42/EC – safety of machinery;
 - 89/336/EEC and 2004/108/EC – electromagnetic compatibility;
 - 73/23/EEC – low voltage devices;
 - PN-EN ISO 12100-1:2005 i 12100-2:2005 – safety of machinery;
 - PN-EN 61326-1:2006 (U) – electromagnetic compatibility;
 - PN-EN 61010-1:2004 – low voltage devices;

8. Scope of responsibility:

#	Task	BOSMAL	Supplier
1	Design of the system lay-out		x (BOSMAL acceptance required)
2	Delivery		x (DAP)
3	Unloading	x	
4	Storage	x	
5	Unpacking		x
6	Locating the system components	x	x (Technical support + supervision)
7	Assembling and integrating all system components		x
8	Feeding media (water, power supply, compressed air)	x	
9	Commissioning		x
10	Acceptance Tests	x	x
11	Final acceptance	x	x
12	Training		x

D. TRAINING, WARRANTY, SERVICE

The Supplier of the unit shall be obliged to provide the following:

- Training in system operation and maintenance at Supplier and BOSMAL side (including the EPA 1065 functionality);
- Warranty for minimum 36 months and necessary maintenance within this period together with all required consumable parts and service. Warranty time starts from date of commissioning (signing acceptance protocol).
- Service response within 24 hours and service action within 5 working days during the warranty period (experienced engineer with spare parts at BOSMAL side). Maximum repair period 10 working days from notification of the fault. If the failure is not resolved in the above-mentioned period, the faulty unit has to be replaced with a new one.
- Service within 10 working days after expiry of the warranty period (experienced engineer with spare parts at BOSMAL side).
- Maintenance of the complete system just before expiry of the warranty period.

The Supplier can ask for further explanations concerning the order terms on working days during the hours: 07.00 – 14.00. The person responsible in the commercial field is Mr Zbigniew Liszewski – Purchasing Department, phone +48 33 81 30 536, room no. 328, and in the technical field is Dr Piotr Bielaczyc – Engine Research Department, phone +48 33 81 30 598, room no. 113C.

§3. CONDITIONS FOR PARTICIPATION IN THE PROCEDURE

Tenderers which fulfil the following requirements are eligible to submit offers:

1. Have the necessary knowledge and experience and have at their disposal the technical potential and personnel capable of executing the contract;
2. Have the authorisations to perform specific activities or actions, if such authorisations are required by the law;
3. Are in a financial and economic situation to ensure full completion of the contract;
4. Have reported an annual turnover above 100 million EUR;
5. Are not liable to exclusion from the tender procedure (Polish Public Procurements Law, article 24, paragraph 1);
6. Have completed at least ten contracts similar in their nature – analyser set for continuous measurement of undiluted exhaust gases – for carmakers, oil and fuel companies, OEM suppliers and R&D centres in the last 5 years, with at least 1 such project for BOSMAL's main customers: FIAT, FPT, or GM.

7. Have paid the deposit prior to the final date for submission of the offers, the deposit for the amount of 20 000 PLN or 5 000 EUR, to be retained during the period in which the Tenderer must maintain their offer. The deposit paid in currency shall be paid by bank transfer into either the bank account for PLN: 32 1240 4142 1111 0000 4823 8630, or for EUR: 39 1240 4142 1978 0000 4823 0559 – SWIFT: PKOPPLPW; Bank Pekao SA O/Bielsko-Biała.
8. The awarding entity will retain the deposit, together with interest earned, if the Tenderer fails to submit documents, statements and powers of attorney (as referred to in article 25 paragraph 1), in response to the request referred to in article 26 paragraph 3 of the Act, unless the Tenderer can prove that this was due to events beyond the Tenderer's control.

§4. DESCRIPTION OF OFFER PREPARATION

1. The offer shall be prepared in Polish, using a document format which cannot be altered without leaving a trace of the amendments made. The awarding entity agrees on the submission of part of offer referring to technical description in English version (Polish Public Procurements Law, article 9).
2. The offer should have numbered pages, beginning with 1 on the first page. Pages of documents mentioned in points 6 and 9 must also be numbered. All pages must be securely fastened together, so that no material can be removed.
3. The offer must begin with the fully completed "Offer" form (Appendix no. 1 of SEC).
4. Each page of the offer must be signed by a person authorized to sign the offer.
5. Any corrections must be signed by a person authorized to sign the offer.
6. The offer should include the following documentation:
 - I. Documents confirming fulfilment of the conditions for participation, such as:
 - a declaration that the Tenderer has the necessary knowledge and experience and has at their disposal the technical potential and personnel capable of performing the contract,
 - a declaration that the authorisations to perform specific activities or actions, if such authorisations are required by the law;
 - a declaration that the Tenderer is in financial and economic situation to ensure the completion of the contract;
 - a financial declaration (Appendix no. 3 of SEC, with all required documents);
 - a declaration that the Tenderer is not excluded from the tender procedure according to Polish Public Procurements Law, article 24, paragraph 1;

- a list of contracts similar in their capacity, performed within the past 5 years for carmakers and OEM Suppliers with details referring to dates of delivery and customers;
- a current copy of the relevant entry in a Register of Companies;
- a declaration that the Tenderer does not have social insurance and/or tax arrears;
- a declaration that the Tenderer has no entry in the applicable National Register of Criminal Records, according to Polish Public Procurements Law, article 24, paragraph 1, p. 4-9.

Foreign Tenderers should submit documents issued according to the legal regulations of the country of origin, in English.

II. The offer should also include a technical description of the item of the order, in Polish or English.

7. The Tenderer may submit only one offer containing one final price for the item of order.
8. The awarding entity does not permit the possibility of submitting supply for lots; the offer must include all analysers referred to in Part A, point 1.1.1.
9. In cases where the Tenderer is represented by a plenipotentiary, an adequate power of attorney ought to be enclosed to the offer.
10. In cases where materials other than those required for the tender application are sent, they should be delivered as a separate package, not included in the offer.
11. Documents and information presented in the offer which are confidential to the Tenderer and which should not be made available to other participants, ought to be indicated as **“Company secret”** and delivered as a separate consignment, not attached to the offer.
12. The offer shall be delivered in closed packaging and identified: **“Offer for Exhaust Emissions Measurement System - Engine Dyno”**.
13. Offers that do not fulfil the above-mentioned requirements shall be rejected in accordance with Polish Public Procurements Law, article 89, paragraph 1.

§5. EVALUATION OF THE OFFERS

1. The basic version of the offered emissions test system should fulfil all the minimum requirements, as expressed in points: § 2 of SEC, parts B, C and D.
2. The awarding entity may require the Tenderer to provide explanations concerning the contents of submitted offer and correct any computational errors

in the calculation of prices, according to Polish Public Procurements Law, articles 87.

3. The weightings of the evaluation criteria of the offer are as follows:

Criterion	W [%]
Price of the complete system (with necessary maintenance and consumable parts during warranty period), including full integration into BOSMAL's test bench automation systems, training and all relevant software	80
Extension of warranty period over 3 years	10 per year, up to a maximum of 20
Total	100

Price evaluation method:

$$L_c = \frac{C_{\min}}{C} \times 80,$$

where:

- L_c is the number of points obtained for the price criterion,
 C_{\min} is the lowest price value of all offers,
 C is the price value of the offer under evaluation.

- Prices expressed in EUR will be transferred into PLN according to NBP (Polish National Bank) middle exchange rate from the day of the opening of the offers.
- The awarding entity shall inform all Tenderer who have submitted tenders of the selection of the best offer, in writing.
- Where the best offer cannot be selected as two or more offers represent the same balance of evaluation, the awarding entity shall call upon the Tenderer to submit additional offers, within a specified period.
- Decisions will be made regarding the options after the offers have been opened.
- The tender procedure may be cancelled in certain cases, as specified in Polish Public Procurements Law, article 93 (eg. the project will not be confirmed by FNI TP).

§6 TERMS

1. Submission of the offers

Offers shall to be submitted to the Purchasing Department of BOSMAL Automotive R&D Institute Ltd, room 328 or 361, ul. Sarni Stok 93, 43-300 Bielsko-

Biała, by 12⁰⁰ on **05.09.2011**; any offers delivered later than this will not be considered.

2. Validity of the offers

The Tenderer must maintain their offer for a period of 60 days. The period during which the Tenderer must maintain his offer shall commence with expiry of the time limit for submission of offers (Polish Public Procurements Law, article 85).

3. Opening of the offers

Offers shall be opened in room 401 in BOSMAL Automotive R&D Institute Ltd, ul. Sarni Stok 93, 43-300 Bielsko-Biała, on **05.09.2011** at 12³⁰.

4. Performance of the contract

The acceptance procedure of the contract must be completed by 30.12.2011 (demanded).

§7 ADDITIONAL CONDITIONS

1. The Tenderer shall be entitled to the legal protection measures specified in Polish Public Procurements Law.
2. The awarding entity provides the award of supplementary contracts in accordance with Polish Public Procurements Law, article 67, paragraph 1, p.6.
3. The awarding entity shall request the Tenderer to provide security on due performance of the contract for the amount of 5 % of the offered net price. The awarding entity shall return the security according to the conditions specified in the contract (Appendix no 2 of SEC).

§8. APPENDICES

1. Offer form
2. Contract template
3. Financial declaration form
4. Schematic diagrams of BOSMAL's test cells with a concept of the item of order integration.

END of the SEC.