

**RETURN BIDS TO:**  
**RETOURNER LES SOUMISSIONS À:**  
**Bid Receiving - PWGSC / Réception des**  
**soumissions - TPSGC**  
**11 Laurier St./ 11 rue, Laurier**  
**Place du Portage, Phase III**  
**Core 0A1 / Noyau 0A1**  
**Gatineau, Québec K1A 0S5**  
**Bid Fax: (819) 997-9776**

**REQUEST FOR PROPOSAL**  
**DEMANDE DE PROPOSITION**

**Proposal To: Public Works and Government**  
**Services Canada**

We hereby offer to sell to Her Majesty the Queen in right of Canada, in accordance with the terms and conditions set out herein, referred to herein or attached hereto, the goods, services, and construction listed herein and on any attached sheets at the price(s) set out therefor.

**Proposition aux: Travaux Publics et Services**  
**Gouvernementaux Canada**

Nous offrons par la présente de vendre à Sa Majesté la Reine du chef du Canada, aux conditions énoncées ou incluses par référence dans la présente et aux annexes ci-jointes, les biens, services et construction énumérés ici sur toute feuille ci-annexée, au(x) prix indiqué(s).

**Comments - Commentaires**

<b>Title - Sujet</b> Exhaust emissions analyzer (Portabl	
<b>Solicitation No. - N° de l'invitation</b> K8A21-120034/A	<b>Date</b> 2012-09-17
<b>Client Reference No. - N° de référence du client</b> K8A21-120034	
<b>GETS Reference No. - N° de référence de SEAG</b> PW-\$\$PV-929-61200	
<b>File No. - N° de dossier</b> pv929.K8A21-120034	<b>CCC No./N° CCC - FMS No./N° VME</b>
<b>Solicitation Closes - L'invitation prend fin</b> <b>at - à 02:00 PM</b> <b>on - le 2012-10-29</b>	
<b>Time Zone</b> <b>Fuseau horaire</b> Eastern Daylight Saving Time EDT	
<b>F.O.B. - F.A.B.</b> <b>Plant-Usine:</b> <input type="checkbox"/> <b>Destination:</b> <input checked="" type="checkbox"/> <b>Other-Autre:</b> <input type="checkbox"/>	
<b>Address Enquiries to: - Adresser toutes questions à:</b> Martin, Doug	<b>Buyer Id - Id de l'acheteur</b> pv929
<b>Telephone No. - N° de téléphone</b> (819) 956-4037 ( )	<b>FAX No. - N° de FAX</b> (819) 956-3814
<b>Destination - of Goods, Services, and Construction:</b> <b>Destination - des biens, services et construction:</b> DEPARTMENT OF THE ENVIRONMENT AIR QUALITY RESEARCH 335 RIVER RD ATTN: GREG RIDEOUT OTTAWA Ontario K1A0H3 Canada	

**Instructions: See Herein**

**Instructions: Voir aux présentes**

**Vendor/Firm Name and Address**  
**Raison sociale et adresse du**  
**fournisseur/de l'entrepreneur**

**Issuing Office - Bureau de distribution**  
Scientific, Medical and Photographic Division / Division de  
l'équipement scientifique, des produits photographiques et  
pharmaceutiques  
11 Laurier St./ 11 rue, Laurier  
6B1, Place du Portage  
Gatineau, Québec K1A 0S5

<b>Delivery Required - Livraison exigée</b> See Herein	<b>Delivery Offered - Livraison proposée</b>
<b>Vendor/Firm Name and Address</b> <b>Raison sociale et adresse du fournisseur/de l'entrepreneur</b>	
<b>Telephone No. - N° de téléphone</b> <b>Facsimile No. - N° de télécopieur</b>	
<b>Name and title of person authorized to sign on behalf of Vendor/Firm</b> <b>(type or print)</b> <b>Nom et titre de la personne autorisée à signer au nom du fournisseur/</b> <b>de l'entrepreneur (taper ou écrire en caractères d'imprimerie)</b>	
<b>Signature</b>	<b>Date</b>



Item Article	Description	Dest. Code Dest.	Inv. Code Fact.	Qty Qté	U. of I. U. de D.	Destination	Unit Price/Prix unitaire FOB/FAM	Plant/Usine	Delivery Req. Livraison Req.	Del. Offered Liv. offerte
1	PORTABLE EXHAUST EMISSIONS ANALYZE R	K8A21	K8A21	1	Each	\$	XXXXXXXXXXXX	XXXXXXXXXXXX	See Herein	
2	PORTABLE PARTICULATE MASS MEASUREM ENT ANALYZER	K8A21	K8A21	1	Each	\$	XXXXXXXXXXXX	XXXXXXXXXXXX	See Herein	
3	HIGH SPEED EXHAUST FLOW METER	K8A21	K8A21	1	Each	\$	XXXXXXXXXXXX	XXXXXXXXXXXX	See Herein	
4	COMMISSIONING / ACCEPTANCE	K8A21	K8A21	1	Each	\$	XXXXXXXXXXXX	XXXXXXXXXXXX	See Herein	
5	BASIC TRAINING	K8A21	K8A21	1	Each	\$	XXXXXXXXXXXX	XXXXXXXXXXXX	See Herein	

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## **PART 1 - GENERAL INFORMATION**

### **1. Security Requirement**

There is no security requirement associated with the requirement.

### **2. Requirement**

The Emissions Research and Measurement Section (ERMS) of Environment Canada has a requirement for the supply of a Portable Emissions Measurement System (PEMS) in accordance with the mandatory specifications detailed at Annex "A".

Training, manuals included.

### **3. Debriefings**

After contract award, bidders may request a debriefing on the results of the bid solicitation. Bidders should make the request to the Contracting Authority within 15 working days of receipt of notification that their bid was unsuccessful. The debriefing may be provided in writing, by telephone or in person.

## **PART 2 - BIDDER INSTRUCTIONS**

### **1. Standard Instructions, Clauses and Conditions**

All instructions, clauses and conditions identified in the bid solicitation by number, date and title are set out in the Standard Acquisition Clauses and Conditions Manual issued by Public Works and Government Services Canada (PWGSC). The Manual is available on the PWGSC Website:

<http://sacc.pwgsc.gc.ca/sacc/index-e.jsp>.

Bidders who submit a bid agree to be bound by the instructions, clauses and conditions of the bid solicitation and accept the clauses and conditions of the resulting contract.

The following are incorporated by reference into and form part of the bid solicitation.

**The 2003 ( 2012-07-11) Standard Instructions - Goods or Services - Competitive Requirements,**

### **2. Submission of Bids**

Bids must be submitted only to Public Works and Government Services Canada (PWGSC) Bid Receiving Unit by the date, time and place indicated on page 1 of the bid solicitation.

### **3. Applicable Laws**

Any resulting contract must be interpreted and governed, and the relations between the parties determined, by the laws in force in Ontario.

Bidders may, at their discretion, substitute the applicable laws of a Canadian province or territory of their choice without affecting the validity of their bid, by deleting the name of the Canadian province or territory specified and inserting the name of the Canadian province or territory of their choice. If no change is made, it acknowledges that the applicable laws specified are acceptable to the bidders.

### **4. Enquiries - Bid Solicitation**

All enquiries must be submitted in writing to the Contracting Authority no later than ten (10) calendar days before the bid closing date. Enquiries received after that time may not be answered.

Bidders should reference as accurately as possible the numbered item of the bid solicitation to which the enquiry relates. Care should be taken by bidders to explain each question in sufficient detail in order to enable Canada to provide an accurate answer. Technical enquiries that are of a proprietary nature must be clearly marked "proprietary" at each relevant item. Items identified as "proprietary" will be treated as

such except where Canada determines that the enquiry is not of a proprietary nature. Canada may edit the questions or may request that the Bidder do so, so that the proprietary nature of the question is eliminated, and the enquiry can be answered with copies to all bidders. Enquiries not submitted in a form that can be distributed to all bidders may not be answered by Canada.

### PART 3 - BID PREPARATION INSTRUCTIONS

#### 1. Bid Preparation Instructions

Canada requests that bidders provide their bid in separately bound sections as follows:

**Section I: Technical Bid (two (2) hard copies), consisting of technical brochures/literature to verify compliancy and test data, if applicable**

**Section II: Financial Bid (one (1) hard copy)**

**Section III: Certifications (one (1) hard copy)**

#### ***Prices must appear in the financial bid only.***

No prices must be indicated in any other section of the bid.

Bidders are requested to submit one quotation document with prices, and a second quotation document with prices removed.

Canada requests that bidders follow the format instructions described below in the preparation of their bid:

- (a) use 8.5 x 11 inch (216 mm x 279 mm) paper;
- (b) use a numbering system that corresponds to the bid solicitation;
- (c) include the certifications as a separate section of the bid.
- (d) In April 2006, Canada issued a policy directing federal departments and agencies to take necessary steps to incorporate environmental considerations into the procurement process Policy of Green Procurement to assist Canada in reaching its objectives, bidders are encouraged to:

1) use 8.5. X 11 inch ( 216 mm X 279 mm ) paper containing fibre certified as origination from a sustainably-managed forest and /or containing minimum 30% recycled content; and

2) use an environmentally-preferable format including black and white printing instead of colour printing, printing double sided/duplex, using staples or clips instead of cerlox, duotangs or binders.

#### 1.1 Section I: Technical Bid

In their technical bid, bidders should explain and demonstrate how they propose to meet the requirements and how they will carry out the Work.

The following applies to the Requirement and bidders must provide the following information in the bid where applicable:

##### 1.1.1 Product(s) Offered ( To be completed by bidder )

Indicate the make and model of the product(s) offered:

Name of Manufacturer: \_\_\_\_\_

Model/Part Number: \_\_\_\_\_

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**1.1.2 Point of Manufacture/Shipping** ( To be completed by bidder )

The Bidder must state the point of manufacture/shipping of goods:

Location: \_\_\_\_\_ Postal Code: \_\_\_\_\_

**1.1.3 Delivery** ( To be completed by bidder )

Delivery is requested by \_\_\_\_\_, the best delivery that could be offered by the Bidder is \_\_\_\_\_.

**Delivery is Mandatory by March 31, 2013.**

**Installation** ( To be completed by bidder )

On-site installation must be provided and shall be carried out by a qualified service technician.

State your best installation schedule. Installation will be carried out within \_\_\_\_\_ ( \_\_ ) calendar days of delivery and be completed within \_\_\_\_\_ ( \_\_ ) calendar days.

**Documentation** ( To be completed by bidder )

Operator and Service Manuals must be supplied with the equipment.

Operational manuals in English available. \_\_\_\_\_ Yes.

Service manuals in English available. \_\_\_\_\_ Yes.

Operational manuals in French available. \_\_\_\_\_ Yes.

Service manuals in French available. \_\_\_\_\_ Yes.

**Training** ( To be completed by bidder )

On-site user training must be provided for up to \_\_\_\_\_ ( \_\_ ) users. All costs associated with the on-site training must be included in the price.

On-site training will be completed within \_\_\_\_\_ ( \_\_ ) calendar days of installation.  
Provide complete details of training e.g. duration, scope, etc.,

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**Service** ( To be completed by bidder )

Purchase of the system must include: regional technical support; technical phone support; support via the Internet; and support via a fax-back document system.

Response for service shall be within 24 hours or less.

Also, provide the following with your bid:

- a) Location of available service facilities (after sales service and repair). List the service facilities closest to the destination.

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b) Locations of available replacement parts from consumables to major components.

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c) Response time re: service calls, and escalation schedule, i.e. (how many days with no resolution to a problem until a more experienced person is called in, and from which location).

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e) List the frequency of routine maintenance visits provided by a qualified service technician during the warranty period, if applicable and included in the price.

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**1.1.4 Contacts**

Bidders are requested to provide the following:

Information pertaining to Part 6, Resulting Contract Clauses. 5.3 Contractor's Representative.

**1.2 Section II: Financial Bid**

Bidders must submit their financial bid in accordance with the Basis of Payment. The total amount of Goods and Services Tax (GST) or Harmonized Sales Tax (HST) is to be shown separately, if applicable.

**PART 4 - EVALUATION PROCEDURES AND BASIS OF SELECTION**

**1. Evaluation Procedures**

- (a) Bids will be assessed in accordance with the entire requirement of the bid solicitation including the technical and financial evaluation criteria herein; and
- (b) An evaluation team composed of representatives of Canada will evaluate the bids.

All proposals submitted shall be completed in full and provide all of the information requested in the Request for Proposal (RFP) package to enable a full and complete evaluation. If the requirement is not addressed in the bidder's proposal, the proposal will be considered incomplete or non-responsive and will be rejected. The onus is on the bidder to provide all the information necessary to ensure a complete and accurate assessment.

## 2 Factors for Evaluation

1. **PRICING BASIS (MANDATORY):** Prices must be firm.
2. **BID VALIDITY PERIOD (MANDATORY):** Offers are to remain open for a period of not less than ninety (60) days from the date of closing of this Request for Proposal.
3. **ABILITY TO MEET THE TECHNICAL REQUIREMENT (MANDATORY):**

a) For Items Defined by Specifications:

The bidder MUST cross reference the mandatory technical criteria contained herein to their proposal providing clear indication where a bid does NOT conform to the specifications. If no exceptions are taken to the specifications, Canada will assume the bidder's complete compliance in their assessment of the offer and in any subsequent contract award.

b) Provision of Supporting Technical Documentation:

Supporting technical documentation for the stores offered shall be provided with the bid at time of bid closing. Technical brochures or technical data MUST be provided to verify compliancy to the technical mandatory specifications

## 4. COMPLIANCE WITH THE TERMS AND CONDITIONS OF THIS REQUEST FOR PROPOSAL (MANDATORY)

5. **FOR CANADIAN SUPPLIERS ONLY:** Please note that the requirements of the Federal Contractors Program for Employment Equity may apply - see herein. (MANDATORY if applicable)

### 3. Basis of Selection

1. A bid must comply with the requirements of the bid solicitation and meet all mandatory technical evaluation criteria to be declared responsive. The responsive bid with the lowest evaluated price, including options, will be recommended for award of a contract.
2. The lowest evaluated price will be established using the following criteria:
  - a) Prices will be evaluated in Canadian Funds including any applicable Excise Taxes and Canadian Customs Duty (if applicable) and excluding the Goods and Services Tax (GST) or Harmonized Sales Tax (HST). For evaluation purposes, bids received in a foreign currency will be converted to Canadian funds using the appropriate rate of exchange using the rate quoted by the Bank of Canada as being in effect on date of bid closing;
  - b) Prices will be evaluated on a "DDP Destination" basis, unless otherwise specified.
3. Requests for Exchange Rate Fluctuation Protection and/or Progress Payments will not be considered.

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**PART 5 - CERTIFICATIONS**

**Certifications with the Bid**

In order to be considered for contract award, a bidder whose bid is technically and financially responsive, must meet the following conditions:

**Code of Conduct Certifications - Certifications Required Precedent to Contract Award**

Bidders should provide, with their bids or promptly thereafter, a complete list of names of all individuals who are currently directors of the Bidder.

\_\_\_\_\_  
Family Name

\_\_\_\_\_  
Given Name(s)

If such a list has not been received by the time the evaluation of bids is completed, the Contracting Authority will inform the Bidder of a time frame within which to provide the information.

Bidders must submit the list of directors before contract award, failure to provide such a list within the required time frame will render the bid non-responsive.

The Contracting Authority may, at any time, request that a Bidder provide properly completed and Signed Consent Forms (Consent to a Criminal Record Verification form - PWGSC-TPSGC 229) (<http://www.tpsgc-pwgsc.gc.ca/app-acq/forms/documents/229.pdf>), for any or all individuals named in the aforementioned list within a specified delay.

Failure to provide such Consent Forms within the delay will result in the bid being declared non-responsive.

**Federal Contractors Program for Employment Equity - \$200,000 or more**

1. The Federal Contractors Program for Employment Equity (FCP-EE) requires that some organizations bidding for federal government contracts, valued at \$200,000 or more (including all applicable taxes), make a formal commitment to implement employment equity, as a condition precedent to the contract award. If the bidder is subject to the Program, evidence of its commitment must be provided prior to the award of any contract.

Contractors that have been declared Ineligible Contractors by the Department of Human Resources and Skills Development (HRSD) are no longer eligible to receive government contracts over the threshold for solicitation of bids as set out in the Government Contract Regulations (currently at \$25,000, including all

applicable taxes), either as a result of a finding of non-compliance by the Department of HRSD, or following their voluntary withdrawal from the Program for a reason other than the reduction in their workforce. Any bid from ineligible contractors will not be considered for award.

2. The Bidder certifies its status with FCP-EE, as follows:

The Bidder

- (a) ( ) is not subject to FCP-EE, having a workforce of less than 100 permanent full or part-time employees in Canada,
- (b) ( ) is not subject to FCP-EE, being a regulated employer under the Employment Equity Act;
- (c) ( ) is subject to the requirements of FCP-EE, having a workforce of 100 or more permanent full or part-time employees in Canada, but has not previously obtained a certificate number from the Department of HRSD, (having not bid on requirements of \$200,000 or more), in which case a duly signed certificate of commitment is provided herewith (attached);
- (d) ( ) is subject to FCP-EE, and has a valid certification number as follows: \_\_\_\_\_ (e.g. Has not been declared Ineligible Contractor by the Department of HRSD).

3. If the Bidder does not fall within the exceptions enumerated in 2. (a) or (b), the Program requirements do apply, and as such, the Bidder is required to submit to the Department of HRSD form LAB 1168, Certificate of Commitment to Implement Employment Equity, DULY SIGNED or a valid Certificate number confirming its adherence to the FCP-EE.

4. The Bidder acknowledges that the Minister shall rely on this certification to award the Contract. Should a verification by the Minister disclose a misrepresentation on the part of the Bidder, the Minister shall have the right to treat any contract resulting from this bid as being in default, and to terminate it pursuant to the Default provisions of the Contract.

5. In all cases, the Bidder is required to produce evidence or supporting information on demand prior to contract award, if such evidence is not included with its bid.

Signature of authorized representative: \_\_\_\_\_ .Date: \_\_\_\_\_

NOTE:Information on the FCP-EE and the Certificate of Commitment (LAB 1168) are available on the following Department of HRSD Website:

<http://www.hrsdc.gc.ca/en/gateways/topics/wzp-gxr.shtml> and <http://www100.hrdc.gc.ca/labswenm1e.shtml>, respectively.

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## PART 6 - RESULTING CONTRACT CLAUSES

### 1. Security Requirement

There is no security requirement associated with the requirement.

### 2. Requirement

The Emissions Research and Measurement Section (ERMS) of Environment Canada has a requirement for the supply of a Portable Emissions Measurement System (PEMS) in accordance with the mandatory specifications detailed at Annex "A".

Training, manuals included.

### 3. Standard Clauses and Conditions

All clauses and conditions identified in the Contract by number, date and title are set out in the Standard Acquisition Clauses and Conditions Manual issued by Public Works and Government Services Canada (PWGSC). The Manual is available on the PWGSC Website: <http://sacc.pwgsc.gc.ca/sacc/index-e.jsp>.

#### 3.1 General Conditions

2010A ( 2012-07-16) General Conditions - Goods (Medium Complexity), apply to and form part of the Contract.

### 4. Term of Contract

The contract will be force until all warranty and or optional provisions of this agreement are expired

#### 4.1 Delivery Date

Delivery must be completed on or before (*to be filled in at contract award*).

#### 4.1.2 Shipping Instructions

##### 4.1.2. Shipping Instructions - Delivery at Destination

1. Shipment shall be consigned to the destination specified, and delivered:

DDP Delivered Duty Paid Ottawa, Ontario Incoterms 2000.

2. The Contractor will be responsible for all delivery charges, administration, costs and risk of transport and customs clearance, including the payment of customs duties and taxes.

### 5. Authorities

#### 5.1 Contracting Authority

The Contracting Authority for the Contract is:

**Doug Martin, Supply Specialist ( PV )**

Public Works and Government Services Canada  
Acquisitions Branch  
Commercial Consumer Products Directorate  
11 Laurier Street, ( 44 ) 6A2, Phase III  
Place du Portage, Hull, Quebec, K1A 0S5

Telephone: (819) 956 4037

Facsimile: (819) 956-3814

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E-mail address: **doug.martin@pwgsc.gc.ca**

The Contracting Authority is responsible for the management of the Contract and any changes to the Contract must be authorized in writing by the Contracting Authority. The Contractor must not perform work in excess of or outside the scope of the Contract based on verbal or written requests or instructions from anybody other than the Contracting Authority.

**5.2 Technical Authority** (to be filled in only at contract award)

The Technical Authority for the Contract is:

The Technical Authority named above is the representative of the department or agency for whom the Work is being carried out under the Contract and is responsible for all matters concerning the technical content of the Work under the Contract. Technical matters may be discussed with the Technical Authority, however the Technical Authority has no authority to authorize changes to the scope of the Work. Changes to the scope of the Work can only be made through a contract amendment issued by the Contracting Authority..

**5.3 Contractor's Representative**

**Contractor's Representative** ( To be completed by bidder )

The telephone number of the person responsible for :

**General enquiries**

Name: \_\_\_\_\_ Telephone No. \_\_\_\_\_

Facsimile No. \_\_\_\_\_ E-mail address: \_\_\_\_\_

**Delivery Follow-up**

Name: \_\_\_\_\_ Telephone No. \_\_\_\_\_

Facsimile No. \_\_\_\_\_ E-mail address: \_\_\_\_\_

**6. Payment**

**6.1 Basis of Payment - Firm Price**

1. In consideration of the Contractor satisfactorily completing all of its obligations under the Contract, the Contractor shall be paid a firm price of **\$ XX.XX** ( to be filled in at contract award) Goods and Services Tax or Harmonize Sales Tax extra, if applicable.
2. No increase in the total liability of Canada or in the price of the Work resulting from any design changes, modifications or interpretations of the Specifications, will be authorized or paid to the Contractor unless such design changes, modifications or interpretations have been approved, in writing, by the Contracting Authority prior to their incorporation in the Work.

## 6.2 Single Payment

Canada will pay the Contractor upon completion and delivery of the Work in accordance with the payment provisions of the Contract if:

- (a) an accurate and complete invoice and any other documents required by the Contract have been submitted in accordance with the invoicing instructions provided in the Contract;
- (b) all such documents have been verified by Canada;
- (c) the Work delivered has been accepted by Canada.

## 7. Invoicing Instructions

### Invoicing Instructions

The Contractor must submit invoices in accordance with the information required in **Section 10, 2010A ( 2011-05-16) General Conditions - Goods or Services ( Medium Complexity)**.

Original copy to **consignee** with one copy to the **Contracting Authority**.

Name: Doug Martin  
 Public Works and Government Services Canada  
 Acquisition Branch, CASMS  
 Telephone: (819) 956-4037  
 Facsimile: (819) 956-3814  
 E-Mail address: doug.martin@pwgsc.gc.ca

**The Invoice contact for the Contract is:** ( *To be filled in at time of contract award* )

## 8. Certifications

Compliance with the certifications provided by the Contractor in its bid is a condition of the Contract and subject to verification by Canada during the entire contract period. If the Contractor does not comply with any certification or it is determined that any certification made by the Contractor in its bid is untrue, whether made knowingly or unknowingly, Canada has the right, pursuant to the default provision of the Contract, to terminate the Contract for default.

## 8.2 SACC Manual Clauses

A2000C	Foreign Nationals (Canadian Contractor)	06/06/16
A2001C	Foreign Nationals (Foreign Contractor)	06/06/16
A9131C	Controlled Goods Production	08/12/12
B1501C	Electrical Equipment	06/06/16
B7500C	Excess Goods	06/06/16
C0100C	Discretionary Audit - Commercial Goods and/or Services	07/05/25
D2001C	Labelling	07/11/30
D9002C	Incomplete Assemblies	07/11/30

## 9. Applicable Laws

The Contract must be interpreted and governed, and the relations between the parties determined, by the laws in force in Ontario.

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K8A21-120034

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## 10. Priority of Documents

If there is a discrepancy between the wording of any documents that appear on the list, the wording of the document that first appears on the list has priority over the wording of any document that subsequently appears on the list.

- (a) the Articles of Agreement;
- (b) **2010A ( 2012-07-16) General Conditions - Goods or Services ( Medium Complexity)**;
- (c) Annex **A**, Requirement;
- (d) the Contractor's bid dated \_\_\_\_\_ as clarified on \_\_\_\_\_ " **or** ", as amended on \_\_\_\_\_

**Annex "A" REQUIREMENT**

***Mandatory Specifications for the Portable Emissions Measurement System (PEMS) :***

Bidder must complete the following statement of compliance.

The Bidder shall indicate compliance to each item. Failure to comply with the mandatory system specifications will render your proposal non-responsive, and no further consideration will be given.

Your quote must include and list all of the components necessary to meet these mandatory specifications.

Bidders must ensure that adequate literature/technical brochure(s) are submitted at time of bid closing to support compliance with all mandatory technical criteria.

**Background**

The Emissions Research and Measurement Section (ERMS) of Environment Canada is responsible for emissions testing under the Canadian Environmental Protection Act 99. Under the Act, Environment Canada has authority for both fuel quality standards and mobile source emission regulations for new light and heavy-duty on-road vehicles/engines, motorcycles, small marine, and utility engines.

The ERMS conducts emissions research from mobile sources, making exhaust emission measurements from vehicles and equipment under real world conditions.

**1.0 Overall System Requirements:**

1.1. The equipment must be modular.

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1.2. Each module must be a vibration proof box containing the respective measurement systems, gas analysers, or combination;

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1.2.1. Module - CO, CO2, O2 must be integrated with exhaust flow electronics.

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1.2.2. Module - Total NOx or NO2 and NO.

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1.2.3. Module - Total hydrocarbons, by Flame Ionization Detection ( FID ).

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1.2.4. Module - Particulate measurement system.

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1.2.5. Module - Exhaust Flow Measurement hardware.

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1.2.6. Module - Power Distribution Control.

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1.2.7. The sample lines (two 3.6 meter, one heated), pressure regulators, the valves that control the gas flows to the analysers as well as all the electronic and software components.

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1.3. The dimension of each single module must not exceed (50x40x20 cm, WxDxH).

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1.4. The "modules" must be able to be operated as standalone analytical devices or as part of a fully integrated Portable Emmissionis Measurement System ( PEMS ) measurement package.

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1.5. The "modules" must not exceed Maximum 15 kg each.

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1.6. The equipment must include a power distribution module (Maximum 15 kg).

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1.7. All the modules must be rugged and equipped with user-friendly connectors. Snap on or push pull, or connector not requiring use of tools to connect.

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1.8. All the connections (tubes, cables, etc ..) must be provided to allow the installation of the different modules at different locations on a vehicle, within a minium range of 3 meters.

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1.9. The equipment must include Windows based laptop and all software to control all modules, to record the relevant parameters: vehicle position from a GPS and weather data) on an included data logger at a rate greater or equal to 1Hz, and to calculate mass emission rates of the specified exhaust components.

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1.10. The measuring equipment, exhaust flow meters and gas analyzers, must meet the performance specifications outlined in USEPA Code of Federal Regulations Part 1065.

The gaseous emission analyzers requirements are as follows, individual component requirements will be provided in respective sections.

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<b>Complete System Rise Time (t10-90) and Fall Time (t90-10)<sup>a</sup></b>	<b>Recording update frequency</b>	<b>Accuracy<sup>b</sup></b>	<b>Repeatability<sup>b</sup></b>	<b>Noise<sup>c</sup></b>
5s	1 Hz	2% of point or 2% of measure	1% of point or 1% of measure	1% of max.

<sup>a</sup> The performance specifications identified in the Table apply separately to rise and fall time.

<sup>b</sup> Accuracy, repeatability, and noise are all determined with the same collected data, as described in US EPA CFR 1065.305 and based upon absolute values. "point" refers to the overall flow-weighted mean value expected at the standard; max refers to peak value expected at the standard over any test interval, not the maximum of the instruments range, measures refers to actual flow weighted mean measured over any test interval.

<sup>c</sup>The procedure for accuracy, repeatability, and noise measurement described in US EPA CFR 1065.305 may be modified for flow meters to allow noise to be measured at the lowest calibrated value instead of zero flow rate.

## 2.0 Carbon Monoxide and Carbon Dioxide Module:

2.1 Measurement principle must be non-dispersive infrared.

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2.2 Details as to instrument specifications in addition to those listed in Section 1. are as follows;

	<b>Range</b>	<b>Resolution</b>	<b>Linearity</b>
CO	0 – 8%	10 ppm	Intercept $\leq 5\%$ of range. $0.990 \leq \text{Slope} \leq 1.01$  SEE $\leq 1.0\%$ of range $r^2 \geq 0.998$
CO2	0 – 20%	0.01%	Intercept $\leq 0.5\%$ of range. $0.990 \leq \text{Slope} \leq 1.01$  SEE $\leq 1.0\%$ of range $r^2 \geq 0.998$

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**3.0 Oxygen**

3.1 Measurement principle must be paramagnetic.

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3.2 Details as to instrument specifications in addition to those listed in Section 1. are as follows;

	<b>Range</b>	<b>Resolution</b>	<b>Linearity</b>
Oxygen	0-25%	0.1%	Intercept $\leq 0.5\%$ of range (1% for lowest range) $0.990 \leq \text{Slope} \leq 1.01$ SEE $\leq 1.0\%$ of range $R2 \geq 0.998$

**4.0 Oxides of Nitrogen:**

4.1 Measurement principle must be non-dispersive ultraviolet.

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4.2 Measurement system must report NO and NO2 simultaneously.

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4.3 Details as to instrument specifications in addition to those listed in Section 1. are as follows;

	<b>Range</b>	<b>Resolution</b>	<b>Linearity</b>
NO	300/900/3000 ppm	0.1 ppm	Intercept $\leq 0.5\%$ range $0.990 < \text{Slope} < 1.01$ SEE $< 1.0\%$ of range $r2 > 0.998$
NO2	100/300 ppm	0.1 ppm	Intercept = 0.5% range $0.990 < \text{Slope} < 1.01$ SEE $< 1.0\%$ of range $r2 > 0.998$

**5.0 Total Hydrocarbons**

5.1 Measurement principle must be heated flame ionization detector.

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5.2 The FID should be capable of using room air for combustion air.

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5.3 Details as to instrument specifications in addition to those listed in Section 1. are as follows;

	<b>Range</b>	<b>Linearity</b>
THC	100/30000 ppm Carbon	Intercept $\leq$ or $=$ to 0.5% of range (1% for lowest range) $0.990 \leq \text{Slope} \leq 1.01$ $\text{SEE} \leq 1.0\%$ of range $R^2 \geq 0.998$

5.4 The heated FID system must also include specialized components as follows:

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5.4.1 Heated sample line (between 3 - 4 meters) For the heated line, the gas must be filtered through a disposable 0.1 micron filter element to remove the particles from the exhaust.

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**6.0 Exhaust Flow Meters**

6.1 The flow meters must consist of a heated sampling tube assembly that is to be mounted directly on the vehicle exhaust pipe and provide a direct continuous measurement of the vehicle exhaust mass flow and exhaust temperature. The flow measurement sensors must be of either of Pitot or Annubar type (or equivalent).

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6.2 The measurement ranges must for tests on vehicles and engines matched to exhaust pipe diameters of 2, 4, and 6 inch.

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6.3 All exhaust flow meters must meet the following requirements:

Exhaust temperature range: 0°C to 700°C.

Exhaust Flow Accuracy:  $\pm 3\%$  of reading or better.

Exhaust Flow Linearity: better than 1 % of full scale.

Exhaust Temperature Accuracy:  $\pm 1\%$  of reading or better.

The probes must be heated and regulated at 190°C to prevent both water and hydrocarbon condensation.

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6.4 A 12 foot wiring harnesses, three pipe extensions, and mounting hardware, must be provided for these systems

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**7.0 Particulate Measurements**

7.1 Must have a partial flow dilution system that meets the requirements of both US EPA CFR 40 part 1065 and ISO 16183 to be used in conjunction with the exhaust flow measurement system or as a stand alone exhaust dilution system.

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7.2 Must have a semi-continuous particulate measurement device that meets the requirements of US EPA CFR 40 part 1065.

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7.3 Must have a continuous particulate measurement device.

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7.4 Must have a particulate filter based system using 47 mm diameter filters for conducting batch type measurements of particulate mass.

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**8.0 Power Distribution**

8.1 The power distribution unit must provide power to all the instruments, from sources of 12 VDC 100-220 V AC.

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**9.0 Auxiliary Systems**

9.1 Must have a Global Positioning System; The GPS module and cabling must provide the data of the vehicle latitude, longitude, elevation and speed.

It must be compact, be usable without any user initialisation and meet the most advanced standards (or equivalent) in terms of position accuracy.

Must simultaneously track up to twelve satellites providing fast time-to-first-fix, one-second navigation updates and low power consumption. Resolution of one meter and an absolute accuracy of 15 meters for latitude, longitude and altitude. Operating temperatures must range from 0°C to 50°C.

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9.2 A weather station that must measure the ambient temperature, pressure and humidity.

Must be a remote device connected via cable to the main unit.

Must measure ranges:

Temperature from -20°C to +40°C,

Humidity from 1 to 100%

Relative Humidity,

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Ambient pressure from 20 to 110 kPa

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9.3 Must have a specialized shock mount plate for instrument modules.

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9.4 Must have a Vehicle/engine computer interface system.

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