



THE CITY OF WINNIPEG

TENDER

TENDER NO. 801-2021

**SUPPLY AND DELIVERY OF MULTI-GAS DETECTORS AND MONITORING
SYSTEM**

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PART B - BIDDING PROCEDURES

B1. CONTRACT TITLE

B1.1 SUPPLY AND DELIVERY OF MULTI-GAS DETECTORS AND MONITORING SYSTEM

B2. SUBMISSION DEADLINE

B2.1 The Submission Deadline is 4:00 p.m. Winnipeg time, March 30, 2022.

B2.2 The Contract Administrator or the Manager of Materials may extend the Submission Deadline by issuing an addendum at any time prior to the time and date specified in B2.1.

B3. ENQUIRIES

B3.1 All enquiries shall be directed to the Contract Administrator identified in D4.1.

B3.2 If the Bidder finds errors, discrepancies or omissions in the Tender, or is unsure of the meaning or intent of any provision therein, the Bidder shall promptly notify the Contract Administrator of the error, discrepancy or omission at least five (5) Business Days prior to the Submission Deadline.

B3.3 Responses to enquiries which, in the sole judgment of the Contract Administrator, require a correction to or a clarification of the Tender will be provided by the Contract Administrator to all Bidders by issuing an addendum.

B3.4 Responses to enquiries which, in the sole judgment of the Contract Administrator, do not require a correction to or a clarification of the Tender will be provided by the Contract Administrator only to the Bidder who made the enquiry.

B3.5 The Bidder shall not be entitled to rely on any response or interpretation received pursuant to B3 unless that response or interpretation is provided by the Contract Administrator in writing.

B3.6 Any enquiries concerning submitting through MERX should be addressed to:
MERX Customer Support
Phone: 1-800-964-6379
Email: merx@merx.com

B4. CONFIDENTIALITY

B4.1 Information provided to a Bidder by the City or acquired by a Bidder by way of further enquiries or through investigation is confidential. Such information shall not be used or disclosed in any way without the prior written authorization of the Contract Administrator. The use and disclosure of the confidential information shall not apply to information which:

- (a) was known to the Bidder before receipt hereof; or
- (b) becomes publicly known other than through the Bidder; or
- (c) is disclosed pursuant to the requirements of a governmental authority or judicial order.

B4.2 The Bidder shall not make any statement of fact or opinion regarding any aspect of the Tender to the media or any member of the public without the prior written authorization of the Contract Administrator.

B5. ADDENDA

B5.1 The Contract Administrator may, at any time prior to the Submission Deadline, issue addenda correcting errors, discrepancies or omissions in the Tender, or clarifying the meaning or intent of any provision therein.

- B5.2 The Contract Administrator will issue each addendum at least two (2) Business Days prior to the Submission Deadline, or provide at least two (2) Business Days by extending the Submission Deadline.
- B5.3 Addenda will be available on the MERX website at www.merx.com.
- B5.4 The Bidder is responsible for ensuring that he/she has received all addenda and is advised to check the MERX website for addenda regularly and shortly before the Submission Deadline, as may be amended by addendum.
- B5.5 The Bidder shall acknowledge receipt of each addendum in Paragraph 10 of Form A: Bid/Proposal. Failure to acknowledge receipt of an addendum may render a Bid non-responsive.
- B5.6 Notwithstanding B3, enquiries related to an Addendum may be directed to the Contract Administrator indicated in D4.

B6. SUBSTITUTES

- B6.1 The Work is based on the Plant, Materials and methods specified in the Tender.
- B6.2 Substitutions shall not be allowed unless application has been made to and prior approval has been granted by the Contract Administrator in writing.
- B6.3 Requests for approval of a substitute will not be considered unless received in writing by the Contract Administrator at least five (5) Business Days prior to the Submission Deadline.
- B6.4 The Bidder shall ensure that any and all requests for approval of a substitute:
- (a) provide sufficient information and details to enable the Contract Administrator to determine the acceptability of the Plant, Material or method as either an approved equal or alternative;
 - (b) identify any and all changes required in the applicable Work, and all changes to any other Work, which would become necessary to accommodate the substitute;
 - (c) identify any anticipated cost or time savings that may be associated with the substitute;
 - (d) certify that, in the case of a request for approval as an approved equal, the substitute will fully perform the functions called for by the general design, be of equal or superior substance to that specified, is suited to the same use and capable of performing the same function as that specified and can be incorporated into the Work, strictly in accordance with the proposed work schedule and the dates specified in the Supplemental Conditions for Total Performance;
 - (e) certify that, in the case of a request for approval as an approved alternative, the substitute will adequately perform the functions called for by the general design, be similar in substance to that specified, is suited to the same use and capable of performing the same function as that specified and can be incorporated into the Work, strictly in accordance with the proposed work schedule and the dates specified in the Supplemental Conditions for Total Performance.
- B6.5 The Contract Administrator, after assessing the request for approval of a substitute, may in his sole discretion grant approval for the use of a substitute as an "approved equal" or as an "approved alternative", or may refuse to grant approval of the substitute.
- B6.6 The Contract Administrator will provide a response in writing, at least two (2) Business Days prior to the Submission Deadline, to the Bidder who requested approval of the substitute.
- B6.6.1 The Contract Administrator will issue an Addendum, disclosing the approved materials, equipment, methods and products to all potential Bidders. The Bidder requesting and obtaining the approval of a substitute shall be responsible for disseminating information regarding the approval to any person or persons he/she wishes to inform.

- B6.7 If the Contract Administrator approves a substitute as an “approved equal”, any Bidder may use the approved equal in place of the specified item.
- B6.8 If the Contract Administrator approves a substitute as an “approved alternative”, any Bidder bidding that approved alternative may base his Total Bid Price upon the specified item but may also indicate an alternative price based upon the approved alternative. Such alternatives will be evaluated in accordance with B17.
- B6.9 No later claim by the Contractor for an addition to the Total Bid Price because of any other changes in the Work necessitated by the use of an approved equal or an approved alternative will be considered.

B7. BID SUBMISSION

- B7.1 The Bid shall consist of the following components:
- (a) Form A: Bid/Proposal;
 - (b) Form B: Prices;
 - (c) Form N: Requirements.
- B7.2 All components of the Bid shall be fully completed or provided, and submitted by the Bidder no later than the Submission Deadline, with all required entries made clearly and completely.
- B7.3 The Bid shall be submitted electronically through MERX at www.merx.com.
- B7.3.1 Bids will **only** be accepted electronically through MERX.
- B7.4 Bidders are advised that inclusion of terms and conditions inconsistent with the Tender document, including the General Conditions, will be evaluated in accordance with B17.1(a).

B8. BID

- B8.1 The Bidder shall complete Form A: Bid/Proposal, making all required entries.
- B8.2 Paragraph 2 of Form A: Bid/Proposal shall be completed in accordance with the following requirements:
- (a) if the Bidder is a sole proprietor carrying on business in his own name, his name shall be inserted;
 - (b) if the Bidder is a partnership, the full name of the partnership shall be inserted;
 - (c) if the Bidder is a corporation, the full name of the corporation shall be inserted;
 - (d) if the Bidder is carrying on business under a name other than his own, the business name and the name of every partner or corporation who is the owner of such business name shall be inserted.
- B8.2.1 If a Bid is submitted jointly by two or more persons, each and all such persons shall identify themselves in accordance with B8.2.
- B8.3 In Paragraph 3 of Form A: Bid/Proposal, the Bidder shall identify a contact person who is authorized to represent the Bidder for purposes of the Bid.
- B8.4 Paragraph 13 of Form A: Bid/Proposal shall be signed in accordance with the following requirements:
- (a) if the Bidder is a sole proprietor carrying on business in his own name, it shall be signed by the Bidder;
 - (b) if the Bidder is a partnership, it shall be signed by the partner or partners who have authority to sign for the partnership;
 - (c) if the Bidder is a corporation, it shall be signed by its duly authorized officer or officers;

- (d) if the Bidder is carrying on business under a name other than his own, it shall be signed by the registered owner of the business name, or by the registered owner's authorized officials if the owner is a partnership or a corporation.

B8.4.1 The name and official capacity of all individuals signing Form A: Bid/Proposal should be entered below such signatures.

B8.5 If a Bid is submitted jointly by two or more persons, the word "Bidder" shall mean each and all such persons, and the undertakings, covenants and obligations of such joint Bidders in the Bid and the Contract, when awarded, shall be both joint and several.

B9. PRICES

B9.1 The Bidder shall state a price in Canadian funds for each item of the Work identified on Form B: Prices.

B9.1.1 Notwithstanding C12.2.3, prices on Form B: Prices shall not include the Goods and Services Tax (GST) or Manitoba Retail Sales Tax (MRST, also known as PST), which shall be extra where applicable.

B9.2 The quantities listed on Form B: Prices are to be considered approximate only. The City will use said quantities for the purpose of comparing Bids.

B9.3 The quantities for which payment will be made to the Contractor are to be determined by the Work actually performed and completed by the Contractor, to be measured as specified in the applicable Specifications.

B9.4 Payments to Non-Resident Contractors are subject to Non-Resident Withholding Tax pursuant to the Income Tax Act (Canada).

B9.5 The Bidder shall enter the Total Bid Price from Form B: Prices into the Total Bid Price field in MERX.

B9.6 Bidders are advised that the calculation indicated in B17.4 will prevail over the Total Bid Price entered in MERX.

B10. FORM N: REQUIREMENTS

B10.1 The Bidder shall ensure all requirements listed on Form N: Requirements are met.

B11. DISCLOSURE

B11.1 Various Persons provided information or services with respect to this Work. In the City's opinion, this relationship or association does not create a conflict of interest because of this full disclosure. Where applicable, additional material available as a result of contact with these Persons is listed below.

B11.2 The Persons are:

- (a) Levitt-Safety Ltd. – Specifications and Budget
- (b) ABC Fire and Safety – Specifications and Budget
- (c) Draeger Safety Canada Ltd. – Specifications and Budget

B12. CONFLICT OF INTEREST AND GOOD FAITH

B12.1 Further to C3.2, Bidders, by responding to this Tender, declare that no Conflict of Interest currently exists, or is reasonably expected to exist in the future.

B12.2 Conflict of Interest means any situation or circumstance where a Bidder or employee of the Bidder proposed for the Work has:

- (a) other commitments;
- (b) relationships;
- (c) financial interests; or
- (d) involvement in ongoing litigation;

that could or would be seen to:

- (i) exercise an improper influence over the objective, unbiased and impartial exercise of the independent judgment of the City with respect to the evaluation of Bids or award of the Contract; or
- (ii) compromise, impair or be incompatible with the effective performance of a Bidder's obligations under the Contract;
- (e) has contractual or other obligations to the City that could or would be seen to have been compromised or impaired as a result of its participation in the Tender process or the Work; or
- (f) has knowledge of confidential information (other than confidential information disclosed by the City in the normal course of the Tender process) of strategic and/or material relevance to the Tender process or to the Work that is not available to other bidders and that could or would be seen to give that Bidder an unfair competitive advantage.

B12.3 In connection with its Bid, each entity identified in B12.2 shall:

- (a) avoid any perceived, potential or actual Conflict of Interest in relation to the procurement process and the Work;
- (b) upon discovering any perceived, potential or actual Conflict of Interest at any time during the Tender process, promptly disclose a detailed description of the Conflict of Interest to the City in a written statement to the Contract Administrator; and
- (c) provide the City with the proposed means to avoid or mitigate, to the greatest extent practicable, any perceived, potential or actual Conflict of Interest and shall submit any additional information to the City that the City considers necessary to properly assess the perceived, potential or actual Conflict of Interest.

B12.4 Without limiting B12.3, the City may, in its sole discretion, waive any and all perceived, potential or actual Conflicts of Interest. The City's waiver may be based upon such terms and conditions as the City, in its sole discretion, requires to satisfy itself that the Conflict of Interest has been appropriately avoided or mitigated, including requiring the Bidder to put into place such policies, procedures, measures and other safeguards as may be required by and be acceptable to the City, in its sole discretion, to avoid or mitigate the impact of such Conflict of Interest.

B12.5 Without limiting B12.3, and in addition to all contractual or other rights or rights at law or in equity or legislation that may be available to the City, the City may, in its sole discretion:

- (a) disqualify a Bidder that fails to disclose a perceived, potential or actual Conflict of Interest of the Bidder or any of its employees proposed for the Work;
- (b) require the removal or replacement of any employees proposed for the Work that has a perceived, actual or potential Conflict of Interest that the City, in its sole discretion, determines cannot be avoided or mitigated;
- (c) disqualify a Bidder or employees proposed for the Work that fails to comply with any requirements prescribed by the City pursuant to B12.4 to avoid or mitigate a Conflict of Interest; and
- (d) disqualify a Bidder if the Bidder, or one of its employees proposed for the Work, has a perceived, potential or actual Conflict of Interest that, in the City's sole discretion, cannot be avoided or mitigated, or otherwise resolved.

B12.6 The final determination of whether a perceived, potential or actual Conflict of Interest exists shall be made by the City, in its sole discretion.

B13. QUALIFICATION

B13.1 The Bidder shall:

- (a) undertake to be in good standing under The Corporations Act (Manitoba), or properly registered under The Business Names Registration Act (Manitoba), or otherwise properly registered, licensed or permitted by law to carry on business in Manitoba, or if the Bidder does not carry on business in Manitoba, in the jurisdiction where the Bidder does carry on business; and
- (b) be financially capable of carrying out the terms of the Contract; and
- (c) have all the necessary experience, capital, organization, and equipment to perform the Work in strict accordance with the terms and provisions of the Contract.

B13.2 The Bidder and any proposed Subcontractor (for the portion of the Work proposed to be subcontracted to them) shall:

- (a) be responsible and not be suspended, debarred or in default of any obligations to the City. A list of suspended or debarred individuals and companies is available on the Information Connection page at The City of Winnipeg, Corporate Finance, Materials Management Division website at <https://www.winnipeg.ca/matmgt/Templates/files/debar.pdf>

B13.3 The Bidder and/or any proposed Subcontractor (for the portion of the Work proposed to be subcontracted to them) shall:

- (a) have successfully carried out work similar in nature, scope and value to the Work; and
- (b) be fully capable of performing the Work required to be in strict accordance with the terms and provisions of the Contract; and
- (c) have a written workplace safety and health program, if required, pursuant to The Workplace Safety and Health Act (Manitoba).

B13.4 The Bidder shall submit, within three (3) Business Days of a request by the Contract Administrator, proof satisfactory to the Contract Administrator of the qualifications of the Bidder and of any proposed Subcontractor.

B13.5 The Bidder shall provide, on the request of the Contract Administrator, full access to any of the Bidder's equipment and facilities to confirm, to the Contract Administrator's satisfaction, that the Bidder's equipment and facilities are adequate to perform the Work.

B14. OPENING OF BIDS AND RELEASE OF INFORMATION

B14.1 Bids will not be opened publicly.

B14.2 Following the Submission Deadline, the names of the Bidders and their Total Bid Prices (unevaluated and pending review and verification of conformance with requirements) will be available on the MERX website at www.merx.com.

B14.3 After award of Contract, the name(s) of the successful Bidder(s) and their Contract amount(s) will be available on the MERX website at www.merx.com.

B14.4 The Bidder is advised that any information contained in any Bid may be released if required by The Freedom of Information and Protection of Privacy Act (Manitoba), by other authorities having jurisdiction, or by law or by City policy or procedures (which may include access by members of City Council).

B14.4.1 To the extent permitted, the City shall treat as confidential information, those aspects of a Bid Submission identified by the Bidder as such in accordance with and by reference to Part 2, Section 17 or Section 18 or Section 26 of The Freedom of Information and Protection of Privacy Act (Manitoba), as amended.

B15. IRREVOCABLE BID

- B15.1 The Bid(s) submitted by the Bidder shall be irrevocable for the time period specified in Paragraph 11 of Form A: Bid/Proposal.
- B15.2 The acceptance by the City of any Bid shall not release the Bids of the next two lowest evaluated responsive Bidders and these Bidders shall be bound by their Bids on such Work until a Contract for the Work has been duly executed and the contract security have been furnished as herein provided, but any Bid shall be deemed to have lapsed unless accepted within the time period specified in Paragraph 11 of Form A: Bid/Proposal.

B16. WITHDRAWAL OF BIDS

- B16.1 A Bidder may withdraw his/her Bid without penalty at any time prior to the Submission Deadline.

B17. EVALUATION OF BIDS

- B17.1 Award of the Contract shall be based on the following bid evaluation criteria:
- (a) compliance by the Bidder with the requirements of the Tender, or acceptable deviation therefrom (pass/fail);
 - (b) qualifications of the Bidder and the Subcontractors, if any, pursuant to B13 (pass/fail);
 - (c) Form N: Requirements (pass/fail);
 - (d) Total Bid Price;
 - (e) economic analysis of any approved alternative pursuant to B6.
- B17.2 Further to B17.1(a), the Award Authority may reject a Bid as being non-responsive if the Bid is incomplete, obscure or conditional, or contains additions, deletions, alterations or other irregularities. The Award Authority may reject all or any part of any Bid, or waive technical requirements or minor informalities or irregularities if the interests of the City so require.
- B17.3 Further to B17.1(b) and B17.1(c), the Award Authority shall reject any Bid submitted by a Bidder who does not demonstrate, in his Bid or in other information required to be submitted, that he/she is qualified.
- B17.4 Further to B17.1(d), the Total Bid Price shall be the sum of the quantities multiplied by the unit prices for each item shown on Form B: Prices.
- B17.4.1 Further to B17.1(a), in the event that a unit price is not provided on Form B: Prices, the City will determine the unit price by dividing the Amount (extended price) by the approximate quantity, for the purposes of evaluation and payment.
- B17.4.2 Bidders are advised that the calculation indicated in B17.4 will prevail over the Total Bid Price entered in MERX.
- B17.5 This Contract will be awarded as a whole.

B18. AWARD OF CONTRACT

- B18.1 The City will give notice of the award of the Contract, or will give notice that no award will be made.
- B18.2 The City will have no obligation to award a Contract to a Bidder, even though one or all of the Bidders are determined to be qualified, and the Bids are determined to be responsive.
- B18.2.1 Without limiting the generality of B18.2, the City will have no obligation to award a Contract where:
- (a) the prices exceed the available City funds for the Work;
 - (b) the prices are materially in excess of the prices received for similar work in the past;

- (c) the prices are materially in excess of the City's cost to perform the Work, or a significant portion thereof, with its own forces;
- (d) only one Bid is received; or
- (e) in the judgment of the Award Authority, the interests of the City would best be served by not awarding a Contract.

- B18.3 Where an award of Contract is made by the City, the award shall be made to qualified Bidder submitting the lowest evaluated responsive Bid in accordance with B17.
- B18.4 Further to Paragraph 6 of Form A: Bid/Proposal and C4, the City may issue a purchase order to the successful Bidder in lieu of the execution of a Contract.
- B18.4.1 The Contract Documents, as defined in C1.1(p), in their entirety shall be deemed to be incorporated in and to form a part of the purchase order notwithstanding that they are not necessarily attached to or accompany said purchase order.
- B18.5 Following the award of contract, a Bidder will be provided with information related to the evaluation of his/her Bid upon written request to the Contract Administrator.

PART C - GENERAL CONDITIONS

C0. GENERAL CONDITIONS

- C0.1 The *General Conditions for the Combined Provision of Goods and Services (2020-01-31)* are applicable to the Work of the Contract.
- C0.1.1 The *General Conditions for the Combined Provision of Goods and Services* are available on the Information Connection page at The City of Winnipeg, Corporate Finance, Materials Management Division website at http://www.winnipeg.ca/matmgt/gen_cond.stm
- C0.2 A reference in the Tender to a section, clause or subclause with the prefix “**C**” designates a section, clause or subclause in the *General Conditions for the Combined Provision of Goods and Services*.

PART D - SUPPLEMENTAL CONDITIONS

GENERAL

D1. GENERAL CONDITIONS

D1.1 In addition to the *General Conditions for the Combined Provision of Goods and Services*, these Supplemental Conditions are applicable to the Work of the Contract.

D2. SCOPE OF WORK

D2.1 The Work to be done under the Contract shall consist of the supply and delivery of multi-gas detectors and monitoring system for the period from the date of award until June 30, 2023, with the option of four (4) mutually agreed upon one (1) year extensions.

D2.1.1 The City may negotiate the extension option with the Contractor within ninety (90) Calendar Days prior to the expiry date of the Contract. The City shall incur no liability to the Contractor as a result of such negotiations.

D2.1.2 Changes resulting from such negotiations shall become effective on February July 1st of the respective year. Changes to the Contract shall not be implemented by the Contractor without written approval by the Contract Administrator.

D2.1.3 Bidders are advised that, in future, the City may be participating in collaborative procurement initiatives with other levels of government. Accordingly, extensions to this Contract may not be exercised.

D2.2 The major components of the Work are as follows:

- (a) Supply and delivery of multi-gas detectors and monitoring system;
- (b) Provision of software and software support.

D2.3 The Work shall be done on an "as required" basis during the term of the Contract.

D2.3.1 The type and quantity of Work to be performed under this Contract shall be as authorized from time to time by the Contract Administrator and/or Users.

D2.3.2 Notwithstanding C7.4, the City shall have no obligation under the Contract to purchase any quantity of any item in excess of its actual operational requirements.

D2.3 Notwithstanding D2.1, the type and quantity of Work to be performed under this Contract is subject to annual approval of monies therefore in a budget by Council. Bidders are advised that monies have been approved for work up to and including December 31, 2022.

D2.3.1 In the event that Council does not approve the annual budget for any year during this Contract, the City reserves the right to alter the type or quantity of work performed under this Contract, or to terminate the Contract, upon one hundred and twenty (120) Calendar Days written notice by the Contract Administrator. In such an event, no claim may be made against the City for damages of any kind resulting from the termination, including, but not limited to, on the ground of loss of anticipated profit on Work.

D2.4 Notwithstanding D2.1, in the event that operational changes result in substantial changes to the requirements for Work, the City reserves the right to alter the type or quantity of work performed under this Contract, or to terminate the Contract, upon thirty (30) Calendar Days written notice by the Contract Administrator. In such an event, no claim may be made for damages on the ground of loss of anticipated profit on Work.

D3. COOPERATIVE PURCHASE

D3.1 The Contractor is advised that this is a cooperative purchase.

- D3.2 The Contract Administrator may, from time to time during the term of the Contract, may approve other public sector organizations and utilities, including but not limited to municipalities, universities, schools and hospitals, to be participants in the cooperative purchase.
- D3.3 The Contract Administrator will notify the Contractor of a potential participant and provide a list of the delivery locations and estimated quantities.
- D3.4 If any location of the potential participant is more than ten (10) kilometers beyond the boundaries of the City of Winnipeg, the Contractor shall, within fifteen (15) Calendar Days of the written notice, notify the Contract Administrator of the amount of any additional delivery charge for the location.
- D3.5 If any additional delivery charges are identified by the Contractor, the potential participant may accept or decline to participate in the cooperative purchase.
- D3.6 The Contractor shall enter into a contract with each participant under the same terms and conditions as this Contract except:
- (a) supply under the contract shall not commence until the expiry or lawful termination of any other contract(s) binding the participant for the same goods and/or services;
 - (b) a participant may specify a duration of Contract shorter than the duration of this Contract;
 - (c) a participant may specify that only some items under this Contract and/or less than its total requirement for an item are to be supplied under its contract; and
 - (d) any additional delivery charge identified and accepted in accordance with clause D3.4 and D3.5 will apply.
- D3.7 Each participant will be responsible for the administration of its contract and the fulfilment of its obligations under its contract. The City shall not incur any liability arising from any such contract.
- D3.8 No participant shall have the right or authority to effect a change in the Contract, or of any other participant in this Contract.

D4. CONTRACT ADMINISTRATOR

- D4.1 The Contract Administrator is:

Sean Frain
Hazmat Coordinator
Telephone No. 204 226-2238
Email Address. sfrain@winnipeg.ca

- D4.2 At the pre-commencement meeting, the Contract Administrator will identify additional personnel representing the Contract Administrator and their respective roles and responsibilities for the Work.

D5. NOTICES

- D5.1 Notwithstanding C22.4, all notices, requests, nominations, proposals, consents, approvals, statements, authorizations, documents or other communications to the Contractor shall be sent to the address or facsimile number identified by the Contractor in Paragraph 2 of Form A: Bid/Proposal.
- D5.2 All notices, requests, nominations, proposals, consents, approvals, statements, authorizations, documents or other communications to the City, except as expressly otherwise required in, D5.3 or elsewhere in the Contract, shall be sent to the attention of the Contract Administrator identified in D4.

- D5.3 All notices, requests, nominations, proposals, consents, approvals, statements, authorizations, documents or other communications required to be submitted or returned to the City Solicitor shall be sent to the following facsimile number:

The City of Winnipeg
Legal Services Department
Attn: Director of Legal Services
Facsimile No.: 204 947-9155.

SUBMISSIONS

D6. AUTHORITY TO CARRY ON BUSINESS

- D6.1 The Contractor shall be in good standing under The Corporations Act (Manitoba), or properly registered under The Business Names Registration Act (Manitoba), or otherwise properly registered, licensed or permitted by law to carry on business in Manitoba, or if the Contractor does not carry on business in Manitoba, in the jurisdiction where the Contractor does carry on business, throughout the term of the Contract, and shall provide the Contract Administrator with evidence thereof upon request.

SCHEDULE OF WORK

D7. COMMENCEMENT

- D7.1 The Contractor shall not commence any Work until he/she is in receipt of a notice of award from the City authorizing the commencement of the Work.
- D7.2 The Contractor shall not commence any Work on the Site until:
- (a) the Contract Administrator has confirmed receipt and approval of:
 - (i) evidence of authority to carry on business specified in D6;
 - (ii) evidence of the workers compensation coverage specified in C6.18;
 - (iii) the direct deposit application form specified in D13.
 - (b) the Contractor has attended a meeting with the Contract Administrator, or the Contract Administrator has waived the requirement for a meeting.
- D7.3 The Contractor shall commence the Work on the Site within seven (7) Working Days of receipt of the notice of award.

D8. DELIVERY

- D8.1 Goods shall be delivered on an "as required" basis during the term of the Contract, f.o.b. destination, freight prepaid, to:
- 2546 McPhillips Street – Door D (Southside of Building)
Winnipeg, MB
R2P 2T2
- D8.1.1 Goods shall be delivered within forty-five(45)Business Days of the placing of an order.
- D8.2 Initial start-up delivery shall fifteen (15) Business days from the date of award.
- D8.3 After the initial start-up delivery stated in D8.2, Goods shall be delivered in accordance with D8.1.1.
- D8.4 The Contractor shall confirm each delivery with the Contract Administrator or his/her designate, at least two (2) Business Days before delivery.
- D8.5 Goods shall be delivered between 8:00 a.m. and 3:30 p.m. on Business Days.

D8.6 The Contractor shall off-load goods as directed at the delivery location.

D9. COVID-19 SCHEDULE DELAYS

D9.1 The City acknowledges that the schedule for this Contract may be impacted by the COVID-19 pandemic. Commencement and progress of the Work shall be performed by the Contractor with due consideration to the health and safety of workers and the public, directives from health authorities and various levels of government and in close consultation with the Contract Administrator.

D9.2 If the Contractor is delayed in the performance of the Work by reason of the COVID-19 pandemic, the Work schedule may be adjusted by a period of time equal to the time lost due to such delay and costs related to such delay will be determined as identified herein.

D9.3 A minimum of seven (7) Calendar Days prior to the commencement of Work, the Contractor shall declare whether COVID-19 will affect the start date. The Contractor shall provide sufficient evidence that the delay is directly related to COVID-19, including but not limited to evidence related to availability of staff, availability of Material or work by others.

D9.4 For any delay related to COVID-19 and identified after Work has commenced, the Contractor shall within seven (7) Calendar Days of becoming aware of the anticipated delay declare the additional delay and shall provide sufficient evidence as indicated in D9.3. Failure to provide this notice will result in no additional time delays being considered by the City.

D9.5 The Work schedule, including the durations identified in D8 where applicable, will be adjusted to reflect delays accepted by the Contract Administrator.

D9.6 Any time or cost implications as a result of COVID-19 and in accordance with the above, as confirmed by the Contract Administrator, shall be documented in accordance with C7.

D10. ORDERS

D10.1 The Contractor shall provide a local Winnipeg telephone number or a toll-free telephone number at which orders for delivery may be placed.

D11. RECORDS

D11.1 The Contractor shall keep detailed records of the goods supplied under the Contract.

D11.2 The Contractor shall record, as a minimum, for each item listed on Form B: Prices:

- (a) user name(s) and addresses;
- (b) order date(s);
- (c) delivery date(s); and
- (d) description and quantity of goods supplied.

D11.3 The Contractor shall provide the Contract Administrator with a copy of the records for each quarter year within fifteen (15) Calendar Days of a request of the Contract Administrator.

MEASUREMENT AND PAYMENT

D12. INVOICES

D12.1 Further to C12, the Contractor shall submit an invoice for each portion of work performed to:

The City of Winnipeg
Corporate Finance - Accounts Payable
4th Floor, Administration Building, 510 Main Street
Winnipeg MB R3B 1B9

Facsimile No.: 204 949-0864
Send Invoices to CityWpgAP-INVOICES@winnipeg.ca
Send Invoice Inquiries to CityWpgAP-INQUIRIES@winnipeg.ca

D12.2 Invoices must clearly indicate, as a minimum:

- (a) the City's purchase order number;
- (b) date of delivery;
- (c) delivery address;
- (d) type and quantity of work performed;
- (e) the amount payable with GST and MRST shown as separate amounts; and
- (f) the Contractor's GST registration number.

D12.3 The City will bear no responsibility for delays in approval of invoices which are improperly submitted.

D13. PAYMENT

D13.1 Further to C12, the City shall make payments to the Contractor by direct deposit to the Contractor's banking institution, and by no other means. Payments will not be made until the Contractor has made satisfactory direct deposit arrangements with the City. Direct deposit application forms are at https://winnipeg.ca/finance/files/Direct_Deposit_Form.pdf.

D14. PAYMENT SCHEDULE

D14.1 Further to C12, payment shall be in Canadian funds net thirty (30) Calendar Days after receipt and approval of the Contractor's invoice.

WARRANTY

D15. WARRANTY

D15.1 Notwithstanding C13, the warranty period shall begin on the date of Total Performance and shall expire one (1) year thereafter, except where longer warranty periods are specified in the respective Specification sections, unless extended pursuant to C13.2 to C13.3, in which case it shall expire when provided for thereunder.

D15.2 Notwithstanding C13.2, the Contract Administrator may permit the warranty period for a portion or portions of the Work to begin prior to the date of Total Performance if a portion of the Work cannot be completed because of unseasonable weather or other conditions reasonably beyond the control of the Contractor but that portion does not prevent the balance of the Work from being put to its intended use.

D15.2.1 In such case, the date specified by the Contract Administrator for the warranty period to begin shall be substituted for the date specified in C13.2 for the warranty period to begin.

DISPUTE RESOLUTION

D16. DISPUTE RESOLUTION

D16.1 The entire text of C21.4 is deleted, and amended to read: "Intentionally Deleted"

D16.2 The entire text of C21.5 is deleted, and amended to read:

- (a) If Legal Services has determined that the Disputed Matter may proceed in the Appeal Process, the Contractor must, within ten (10) Business Days of the date of the Legal Services Response Letter, submit his written Appeal Form, in the manner and format set out on the City's Materials Management Website, to the Chief Administrative Officer, and to

the Contract Administrator. The Contractor may not raise any other disputes other than the Disputed Matter in his Appeal Form.

- D16.3 Further to C21, prior to the Contract Administrator's issuance of a Final Determination, the following informal dispute resolution process shall be followed where the Contractor disagrees with any opinion, determination, or decision of the Contract Administrator ("Dispute"):
- (a) In the event of a Dispute, attempts shall be made by the Contract Administrator and the Contractor's equivalent representative to resolve Disputes within the normal course of project dealings between the Contract Administrator and the Contractor's equivalent representative.
 - (b) Disputes which in the reasonable opinion of the Contract Administrator or the Contractor's equivalent representative cannot be resolved within the normal course of project dealings as described above shall be referred to a without prejudice escalating negotiation process consisting of, at a minimum, the position levels as shown below and the equivalent Contractor representative levels:
 - (i) The Contract Administrator;
 - (ii) Supervisory level between the Contract Administrator and applicable Department Head;
 - (iii) Department Head.
- D16.3.1 Names and positions of Contractor representatives equivalent to the above City position levels shall be determined by the Contractor and communicated to the City at the pre-commencement or kick off meeting.
- D16.3.2 As these negotiations are not an adjudicative hearing, neither party may have legal counsel present during the negotiations.
- D16.3.3 Both the City and the Contractor agree to make all reasonable efforts to conduct the above escalating negotiation process within twenty (20) Business Days, unless both parties agree, in writing, to extend that period of time.
- D16.3.1 If the Dispute is not resolved to the City and Contractor's mutual satisfaction after discussions have occurred at the final escalated level as described above, or the time period set out in D16.3.3, as extended if applicable, has elapsed, the Contract Administrator will issue a Final Determination as defined in C1.1(v), at which point the parties will be governed by the Dispute Resolution process set out in C21.

THIRD PARTY AGREEMENTS

D17. FUNDING AND/OR CONTRIBUTION AGREEMENT OBLIGATIONS

- D17.1 In the event that funding for the Work of the Contract is provided to the City of Winnipeg by the Government of Manitoba and/or the Government of Canada, the following terms and conditions shall apply, as required by the applicable funding agreements.
- D17.2 Further to D17.1, in the event that the obligations in D17 apply, actual costs legitimately incurred by the Contractor as a direct result of these obligations ("Funding Costs") shall be determined by the actual cost to the Contractor and not by the valuation method(s) outlined in C7.4. In all other respects Funding Costs will be processed in accordance with Changes in Work under C7.
- D17.3 For the purposes of D17:
- (a) "**Government of Canada**" includes the authorized officials, auditors, and representatives of the Government of Canada; and
 - (b) "**Government of Manitoba**" includes the authorized officials, auditors, and representatives of the Government of Manitoba.
- D17.4 Modified Insurance Requirements

- D17.4.1 Where applicable, the Contractor will be required to provide wrap-up liability insurance in an amount of no less than two million dollars (\$2,000,000) inclusive per occurrence. Such policy will be written in the joint names of the City, Contractor, Consultants and all sub-contractors and sub-consultants and include twelve (12) months completed operations. The Government of Manitoba and its Ministers, officers, employees, and agents shall be added as additional insureds.
- D17.4.2 If applicable the Contractor will be required to provide builders' risk insurance (including boiler and machinery insurance, as applicable) providing all risks coverage at full replacement cost, or such lower level of insurance that the City may identify on a case-by-case basis, such as an installation floater.
- D17.4.3 The Contractor shall obtain and maintain third party liability insurance with minimum coverage of two million dollars (\$2,000,000.00) per occurrence on all licensed vehicles operated at the Site. In the event that this requirement conflicts with another licensed vehicle insurance requirement in this Contract, then the requirement that provides the higher level of insurance shall apply.
- D17.4.4 Insurers shall provide satisfactory Certificates of Insurance to the Government of Manitoba prior to commencement of Work as written evidence of the insurance required. The Certificates of Insurance must provide for a minimum of thirty (30) days' prior written notice to the Government of Manitoba in case of insurance cancellation.
- D17.4.5 All policies must be taken out with insurers licensed to carry on business in the Province of Manitoba.
- D17.5 Indemnification By Contractor
- D17.5.1 In addition to the indemnity obligations outlined in C17 of the General Conditions for the Combined Provision of Goods and Services, the Contractor agrees to indemnify and save harmless the Government of Canada and the Government of Manitoba and each of their respective Ministers, officers, servants, employees, and agents from and against all claims and demands, losses, costs, damages, actions, suit or other proceedings brought or pursued in any manner in respect of any matter caused by the Contractor or arising from this Contract or the Work, or from the goods or services provided or required to be provided by the Contractor, except those resulting from the negligence of any of the Government of Canada's or the Government of Manitoba's Ministers, officers, servants, employees, or agents, as the case may be.
- D17.6 Records Retention and Audits
- D17.6.1 The Contractor shall maintain and preserve accurate and complete records in respect of this Contract and the Work, including all accounting records, financial documents, copies of contracts with other parties and other records relating to this Contract and the Work during the term of the Contract and for at least six (6) years after Total Performance. Those records bearing original signatures or professional seals or stamps must be preserved in paper form; other records may be retained in electronic form.
- D17.6.2 In addition to the record keeping and inspection obligations outlined in C6 of the General Conditions for the Combined Provision of Goods and Services, the Contractor shall keep available for inspection and audit at all reasonable times while this Contract is in effect and until at least six (6) years after Total Performance, all records, documents, and contracts referred to in D17.6.1 for inspection, copying and audit by the City of Winnipeg, the Government of Manitoba and/or the Government of Canada and their respective representatives and auditors, and to produce them on demand; to provide reasonable facilities for such inspections, copying and audits, to provide copies of and extracts from such records, documents, or contracts upon request by the City of Winnipeg, the Government of Manitoba, and/or the Government of Canada and their respective representatives and auditors, and to promptly provide such other information and explanations as may be reasonably requested by the City of Winnipeg, the Government of Manitoba, and/or the Government of Canada from time-to-time.

D17.7 Other Obligations

- D17.7.1 The Contractor consents to the City providing a copy of the Contract Documents to the Government of Manitoba and/or the Government of Canada upon request from either entity.
- D17.7.2 If the Lobbyists Registration Act (Manitoba) applies to the Contractor, the Contractor represents and warrants that it has filed a return and is registered and in full compliance with the obligations of that Act, and covenants that it will continue to comply for the duration of this Contract.
- D17.7.3 The Contractor shall comply with all applicable legislation and standards, whether federal, provincial, or municipal, including (without limitation) labour, environmental, and human rights laws, in the course of providing the Work.
- D17.7.4 The Contractor shall properly account for the Work provided under this Contract and payment received in this respect, prepared in accordance with generally accepted accounting principles in effect in Canada, including those principles and standards approved or recommended from time-to-time by the Chartered Professional Accountants of Canada or the Public Sector Accounting Board, as applicable, applied on a consistent basis.
- D17.7.5 The Contractor represents and warrants that no current or former public servant or public office holder, to whom the Value and Ethics Code for the Public Sector, the Policy on Conflict of Interest and Post Employment, or the Conflict of Interest Act applies, shall derive direct benefit from this Contract, including any employment, payments, or gifts, unless the provision or receipt of such benefits is in compliance with such codes and the legislation.
- D17.7.6 The Contractor represents and warrants that no member of the House of Commons or of the Senate of Canada or of the Legislative Assembly of Manitoba is a shareholder, director or officer of the Contractor or of a Subcontractor, and that no such member is entitled to any benefits arising from this Contract or from a contract with the Contractor or a Subcontractor concerning the Work.

PART E - SPECIFICATIONS

GENERAL

E1. APPLICABLE SPECIFICATIONS AND DRAWINGS

- E1.1 These Specifications shall apply to the Work.
- E1.2 Bidders are reminded that requests for approval of substitutes as an approved equal or an approved alternative shall be made in accordance with B6. In every instance where a brand name or design specification is used, the City will also consider approved equals and/or approved alternatives in accordance with B6.

E2. GOODS

- E2.1 The Contractor shall supply and deliver multi-gas detectors and monitoring system in accordance with the requirements hereinafter specified.

E3. 5 GAS MULTI-GAS DETECTOR

E3.1 Physical Characteristics

- (a) **Gas Delivery** - Instrument shall have non-detachable integral pump that is capable of sampling up to 75 feet (22, 86 m) at 0.3 lpm for standard versions of the multi-gas detector.
- (b) **Size:**
- (i) Pumped unit without IR Instrument shall not exceed 6.68" L x 3.52" W x 1.95" H (16.9 cm L x 8.9 cm W x 4.2 cm H) in total size.
 - (ii) Pumped unit with IR Instrument shall not exceed 6.68" L x 3.52" W x 1.65" H (16.9 cm L x 8.9 cm W x 5.0 cm H) in total size.
 - (iii) Pumped unit with PID Instrument shall not exceed 6.69" L x 3.53" W x 2.02" H (17.0 cm L x 9.0 cm W x 5.1 cm H) in total size.
- (c) **Weight** - Weight shall not exceed 1 lb. (453 g) or 1.15 lbs. (680 g) (IR version).
- (d) **Handling** - Instrument shall be a 1-hand operation device.
- (e) **Case Material** - Instrument shall have rugged rubberized armor.
- (f) **Environmental Protection** - Instrument shall be minimum IP65-rated for dust and water ingress.
- (g) **Display Location** - Instrument display shall be viewable from the front.

E3.2 User Interface

- (a) **Display Type** - Display shall be liquid crystal, high-contrast display (LCD), (1.79" x 1.39") (4, 5 cm x 3, 5 cm) with large icons, shall be visible in bright sunlight.
- (i) Display shall be available in either color or monochrome options:
 - (i) PID version shall be in color option only.
 - (ii) A5XM version shall be in mono option only.
- (b) **Backlight** - Instrument shall provide white backlight for low-light viewing.
- (i) Backlight time-out to conserve power must be user-adjustable.
- (c) **Keypad/Switches** - Instrument shall have no more than 3 pushbuttons to operate.
- (i) Buttons shall be easy to operate while gloves are worn.
- (d) **Data Access** - Access to data logs shall be non-intrusive using infrared links to Windows-ready PCs.

E3.3 Monitoring Capability

- (a) **Sensor Configuration** - User shall be able to enable/disable individual sensor channels.
- (b) **“Sensor Missing” Alarm** - All sensor channels shall provide missing sensor alarm if sensor has been removed and sensor channel has not been disabled.
- (c) **Combustible Gas Display** - Instrument shall be capable of displaying combustible gas reading as % Lower Explosive Limit (LEL) or by % volume.
- (d) **Pressure Compensation** - Instrument oxygen sensor shall have built-in pressure compensation.
- (e) **Sensor Types** - Instrument shall be available with the gas sensing options in accordance with Appendix A.

E3.4 Basic Operational Features

- (a) **Instrument Buttons** - Buttons on instrument shall be easy to operate while user wears gloves.
- (b) **Inadvertent Shutoff** - Instrument shall be designed to protect against accidental shutoff.
- (c) **Zero Adjustments** - Instrument shall provide Fresh Air Setup (FAS) function at user's discretion.
- (d) **Zero Adjustment** - Safety lockout FAS function shall not allow the instrument to zero out hazardous readings.
- (e) **Confidence Signals** - Instrument shall provide periodic audible and visual signals indicating instrument operation.
 - (i) User shall have the options of disabling audible and visual signals.
- (f) **Time/Date** - Instrument must be able to display time and date.
 - (i) User must be able to reset time and date without tools.
- (g) **Last Calibration Date** - Instrument must be able to display last successful calibration date.
- (h) **Instrument Power-On** - Power-on instrument button must be clearly marked.

E3.5 Advanced Display & Software Options

- (a) **Industrial Hygiene Display** - Instrument shall have capability of displaying PEAK, STEL and TWA at user's discretion.
 - (i) User shall have ability to enable and disable STEL and TWA functions.
- (b) **Instrument Settings** - All settable instrument parameters (example: alarm set points, expected calibration gas values) shall be protected by user-selectable password.
- (c) **Resetting Functions** - User shall be provided with capability of resetting PEAK, STEL and TWA readings in the field.
- (d) **Measurement Units** - Instrument shall be capable of displaying both types of gas sensors installed and measurement units for each gas.

E3.6 Instrument Alarms

- (a) **Motion Sensor Feature** - Instrument shall offer a motion sensor feature. When activated, instrument shall eventually activate latch alarm when no instrument movement is detected for 30 seconds.
- (b) **Alarm Feature** - Instrument shall have an alarm feature to allow users manual activation of all alarms if situation requires.
- (c) **Visual Alarms** - Visual alarms shall consist of bright, flashing LEDs on top and bottom of instrument and positive indication on unit's display for alarm type identification.
- (d) **Audible Alarm** - Audible alarm shall be rated at a typical >95 dB.
- (e) **Vibrating Alarm** - Unit shall be offered with standard vibrating alarm.

- (f) **Alarm** - Circuit feature catalytic combustible channel shall have non-resettable latching alarm when combustible gas level exceeds 100% LEL, or 5.00%Vol CH₄ when no 0-100%Vol CH₄ IR sensor is installed.
- (g) **Auto Recover Feature** - Catalytic combustible channel shall auto recover from alarm feature circuit situation if 0-100 %Vol CH₄ IR sensor is installed and reading returns to low methane levels.
- (h) **Oxygen Alarms** - Oxygen channel shall have alarm set points for both oxygen deficiency and oxygen enrichment.
- (i) **Alarms Set Points** - Alarm set points shall be user-settable.
- (j) **STEL and TWA Alarm** - Instrument shall provide audible, visual and vibrating alarms if STEL or TWA levels are exceeded.
 - (i) Alarm set points for STEL and TWA shall be user-selectable.
- (k) **Battery Alarms** - Monitor shall provide user with 10-minute warning of battery power loss in all environmental conditions.
 - (i) Power consumption alarms shall activate audible, visual and vibrating alarms.
- (l) **Run Time** - Instrument run time shall be at least 20 hours at room temperature.
 - (i) IR version run time shall be at least 17 hours at room temperature.
 - (ii) PID version run time shall be at least 13 hours at room temperature.
 - (iii) 5XM version run time shall be at least 18 hours at room temperature.
- (m) **Power Supply** - Instrument shall be equipped with rechargeable lithium-ion battery.
 - (i) Alkaline option shall be available (except IR or PID).
- (n) **Battery Life Indication** - Monitor shall provide icon depicting estimated remaining battery operation time.
 - (i) Battery icon must always be visible when instrument is powered on.
- (o) **Charging Cradle** - Charging cradle shall be available.
- (p) **Charger Input Voltages** - Chargers shall be available for 110VAC/220 VAC and 12-24 VDC.
- (q) **Charging Status** - Both instrument and charging cradle shall provide visual indication of battery charging status.

E3.7 Calibration

- (a) **Calibration Tools** - Unit shall require no special tools for calibration other than cylinder, regulator and tubing to supply gas to instrument.
- (b) **Calibration Access** - Calibration access shall be capable of being hidden behind a password if desired.
- (c) **Pushbutton Calibration** - Calibration shall be easily performed using instrument's pushbuttons.
 - (i) Internal instrument access or tools shall not be necessary for calibration.
- (d) **Calibration Time** - Span calibration shall not exceed 60 seconds for LEL, O₂, CO, H₂S, SO₂, and NO₂ XCell sensors and PID.
 - (i) Other gases shall not exceed the following span calibration times in accordance with Appendix B.
- (e) **Automatic Calibration** - Instrument shall be compatible with automated test and with calibration system able to store data.
 - (i) External system shall automatically recognize and calibrate instrument and retain all calibration records.

E3.8 Sampling Systems

- (a) **Sampling Modes** - Instrument shall be available with internal pump.

- (b) **Sampling Systems Filters** - Pump shall contain user-replaceable filters to prevent liquids and dust ingress.
- (c) **Allowable Sample Line Length** - Instrument shall be capable of sample draw from 50 feet within 9 seconds or from 80 feet (24, 38 m) within 15 seconds.
 - (i) Shall be 1'/second rule of thumb, shall be verified in testing. Tubing up to 10' in length will need to be 1/16"ID and then 1/8"ID for anything longer. Standard version - 5 gas multi-gas detector.
- (d) **Fluid Ingress Protection** - Sample probe shall be available, that is designed to prevent water and debris from entering instrument.
- (e) **Reactive Gas Monitoring** - Special sample probe shall be available when used with Cl₂, NH₃ and ClO₂.

E3.9 Sensor Characteristics and Performance

- (a) **Sensor Life:**
 - (i) LEL, O₂, CO, H₂S, NO₂. SO₂ XCell sensors and IR sensors shall have expected 4-year life.
 - (ii) NH₃ and Cl₂ sensors shall have expected 3-year life.
- (b) **End-of-Life Sensor Indicator** - Instrument shall notify user when sensor is close to and at its end-of-life following calibration.
- (c) **Sensors** - All sensors shall have built-in/dedicated control circuitry, including drive circuits, memory, microprocessor, and analog-to-digital converter to all for sensor level control and compensation.
- (d) **Oxygen Sensor** - Oxygen sensor shall be lead-free and use non-consumable chemical reaction.
- (e) **Combustible Sensor** - Combustible sensor must have at minimum the following poison resistance:
 - (i) 3000 ppm*hours to H₂S 90 ppm*hours to silicon
- (f) **CO / H₂S Sensor** - CO / H₂S sensor shall be designed with extremely robust carbon filter for CO channel to block interference. Sensor shall be designed for virtually no cross-channel interference.
- (g) **NH₃ Sensor** - NH₃ sensor shall use non-consuming chemical reaction and self-recover after significant gas exposures.
 - (i) Sensor shall have 3-year or greater expected life.
- (h) **SO₂ Sensor** - SO₂ sensor shall have response time of 10 seconds or less, use non-consuming chemical reaction and self-recover after significant gas exposures.
 - (i) Sensor shall have 3-year or greater expected life.
- (i) **NO₂ Sensor** - NO₂ sensor shall have response time of 15 seconds or fewer.
 - (i) Sensor shall have 4-year or greater expected life.
- (j) **Cl₂ Sensor** - Cl₂ sensor shall have minimal drift even under dry conditions. Sensor shall have virtually no cross-interference with CO, H₂S and SO₂.
 - (i) Sensor shall have 3-year or greater expected life.
- (k) **IR Sensor** - IR sensor shall not rely upon mirror to obtain appropriate path length, as mirrors are highly susceptible to humidity and to condensing atmospheric conditions.
- (l) **Sensor Replacement** - Sensors shall be easily accessed and replaced by users.

E3.10 Data Logging (Instrument Data Storage)

- (a) **Data Logging** - Instrument must be available with standard data logging.
- (b) **Event Log** - Instrument shall record at least 1000 events.
- (c) **Data Log Capacity** - Data log shall record and store data for an average of 200 hours (at 1-minute intervals) without overwriting existing information during normal use.

- (d) **Gas Record Content** - Data log entries shall contain as minimum date, time and record of peak and average readings for each gas sensor (oxygen shall be recorded as maximum and minimum for these intervals).
- (e) **Atmospheric Record** - Instrument shall have provisions to record atmospheric temperature changes.
- (f) **Record Intervals** - Time span among data records shall be user-selectable from 15 seconds to 15 minutes.
- (g) **Data Retention** - Instrument data stored in memory shall not be lost or corrupted in event of sudden instrument power loss.
- (h) **Activity Record Content Page** - Instrument data log shall record and be capable of reporting significant instrument events including:
 - (i) Gas and battery alarms;
 - (ii) Fresh air setups, sensor re-zeroing and calibrations;
 - (iii) Battery voltage and elapsed run time.

E3.11 Certifications

- (a) North America - USA / UL
 - (i) Class I, Division 1, Groups A, B, C & D
 - (ii) Class II, Division 1, Groups E, F & G
 - (iii) Class III, Division 1
 - (iv) Ambient temperature: -40 C to +50 C; T4
 - (v) 5 Gas Multi-Gas Detector with alkaline battery pack T3/T4
 - (vi) 5 Gas Multi-Gas Detector or 5 Gas IR Multi-Gas Detector with rechargeable battery pack T4
- (b) North America - Canada CSA
 - (i) Class I, Division 1, Groups A, B, C & D
 - (ii) CAN/CSA C22.2 No. 152 Combustible Gas Detection Instruments
 - (iii) C22.2 No. 152 Performance Ambient Temperature: -20° C to +50° C
 - (iv) C22.2 No. 157 Intrinsic Safety Ambient Temperature: -40° C to +50° C
 - (v) 5 Gas Multi-Gas Detector with alkaline battery pack T3/T4
 - (vi) 5 Gas Multi-Gas Detector or 5 Gas IR Multi-Gas Detector with rechargeable battery pack T4
- (c) Mining
 - (i) MSHA 30 CFR Part 22
 - (ii) PADE
- (d) **Manufacturing System Quality Approvals** - Instrument manufacturer must be certified as compliant with ISO 9001 provisions.

E3.12 Environmental

- (a) Operating Temperature:
 - (i) Normal Operation: 0° to 40° C;
 - (ii) Extended: -20° to 50° C.
- (b) Short periods (15 minutes):
 - (i) -40° to +50° C (all except PID)
- (c) Humidity:
 - (i) 15-90% RH (non-condensing) continuous;
 - (ii) 5-95% RH (non-condensing) for short periods.

E3.13 Warranty

- (a) **Consumables** - Instrument shall have 3-year back-to-back warranty under normal use conditions, including CO/H₂S/LEL/O₂/SO₂/NO₂ XCell and IR sensors. NH₃ and Cl₂ shall be warranted for 2 years. Other sensors shall be warranted for at least 12 months.

E4. 4 GAS MULTI-GAS DETECTOR

E4.1 Physical Characteristics

- (a) **Size** - Instrument shall not exceed 4.4" L x 3.0" W x 1.4" D (11.2 cm x 7.6 cm x 3.5 cm).
- (b) **Weight** - Weight shall be approximately 8 oz (228 g).
- (c) **Handling** - Instrument shall be a one-hand operation device.
- (d) **Case Material** - Case material shall be rubberized over-mold.
- (e) **Environmental Protection** - Instrument shall be approval agency-certified to IP68 protection levels for dust and water ingress. Instrument shall be capable of immersion in up to 6.5 ft (2m) of water for 1 hour.
- (f) **Impact Protection** - Instrument shall exceed MIL-STD-810G repeated drop test requirements. Instrument shall be capable of surviving an incidental 25-ft (7.62-m) drop.
- (g) **Color** - Charcoal or phosphorescent (glow-in-the-dark) housing.

E4.2 User Interfaces

- (a) **Display Type** - Display shall be liquid crystal display (LCD) with large, easy-to-read characters and icons.
- (b) **Backlight** - Unit must provide white backlight for low-light viewing. Backlight time-out must be user-adjustable.
- (c) **Keypad/Switches** - Unit shall have no more than three switches or pushbuttons to operate.
 - (i) There shall be no requirement to access hidden or internal switches for any instrument operations.
 - (ii) Buttons must be easy to operate when users wear gloves.
- (d) **Data Access** - Access to data log and event log through infrared link to Windows-ready PCs.
- (e) **Bluetooth Connectivity** - Unit shall be capable of transmitting device and alarm data via Bluetooth wireless connection to a gateway device, such as an Android-based cellular phone.

E4.3 Monitoring Capability

- (a) **Gases** - Instrument shall be capable of measuring up to four gases: combustible gas, O₂, and either H₂S/CO, H₂S-LC/CO, H₂S-LC/SO₂, or CO/NO₂.
- (b) **Sensor Configuration** - Ability to enable/disable individual sensor channels.
- (c) **"Sensor Missing" Alarm** - All sensor channels shall provide missing sensor alarm if sensor has been removed and sensor channel has not been disabled.
- (d) **Combustible Gas Display** - Instrument shall be capable of displaying combustible gas reading as % Lower.
 - (i) Explosive Limit (LEL) or 0-5% CH₄ by volume.
- (e) **Pressure Compensation** - Instrument oxygen sensor shall have built-in pressure compensation.
- (f) **Sensor Life Monitoring** - Instrument shall be able to alert user when a particular sensor nears end of life following instrument calibration.
- (g) **Sensor Types** - Instrument shall be available with the gas sensing options in accordance with Appendix D.

E4.4 Basic Operational Features

- (a) **Instrument Buttons** - Buttons on instrument shall be clearly marked and intuitive.
- (b) **Inadvertent Shutoff** - Instrument shall be designed to protect against accidental shutoff.
- (c) **Zero Adjustments** - Instrument shall provide Fresh Air Setup (FAS) function at user's discretion.
- (d) **Zero Adjustment Lockout** - FAS function shall not allow unit to zero out hazardous readings.
- (e) **Confidence Signals** - Periodic audible and visual signals shall indicate instrument operation.
 - (i) User shall be able to disable audible and visual signals.
- (f) **Bump Test Status Indicators** - Instrument shall be capable of indicating its bump test status.
 - (i) Bump PASS: flashing green LED in top right corner and on-screen checkmark.
 - (ii) Bump FAIL or expiration: flashing red LED in top right corner and no checkmark.
- (g) **Time/Date** - Instrument shall be able to display time and date.
 - (i) User shall be able to reset time and date without tools.
- (h) **Last Calibration Date** - Instrument shall be able to display last successful calibration date.
- (i) **Instrument Power-On** - Power-on instrument button shall be clearly marked.

E4.5 Sensor Characteristics and Performance

- (a) **Sensor Life** - Sensors shall have an expected life of four years.
- (b) **End of Life Sensor Indicator** - Instrument shall indicate when sensor is close to and at its end of life following calibration.
- (c) **Sensors** - All sensors shall have built-in control circuitry, including drive circuits, memory, microprocessor, and analog to digital converter to all for sensor level control and compensation.
- (d) **Oxygen Sensor** - Oxygen sensor shall be lead-free and use non-consumable chemical reaction.
- (e) **Combustible Sensor** - Combustible sensor must provide the following poison resistance at minimum:
 - (i) 3000 ppm*hours to H₂S
 - (ii) 90 ppm*hours to silicone
- (f) **CO/H₂S Sensor** - CO/H₂S sensor shall be designed with extremely robust carbon filter for CO channel to block interference. Sensor shall be designed for virtually no cross-channel interference. Sensor shall be designed for two-toxic gas detection in the same physical envelope as a single gas sensor.
- (g) **CO/NO₂ Sensor** - CO/NO₂ sensor shall be designed with extremely robust carbon filter for CO channel to block interference. Sensor shall be designed for two-toxic gas detection in the same physical envelope as a single gas sensor.
- (h) **H₂S/SO₂ Sensor** - H₂S/SO₂ sensor shall be designed to meet the measurement requirements for lowered exposure limit guidelines for H₂S. Sensor shall be designed for two-toxic gas detection in the same physical envelope as a single gas sensor.
- (i) **Sensor Replacement** - Sensors shall be easily accessed and replaced by users. No printed circuit boards should require removal to access sensors.

E4.6 Advanced Display and Software Options

- (a) **Industrial Hygiene Displays** - Instrument shall have capability of displaying PEAK, STEL and TWA at user's discretion.
 - (i) User shall have ability to enable/disable STEL and TWA functions.

- (b) **Instrument Settings** - All settable instrument parameters (example: alarm set points, expected calibration gas values) shall be protected by user-selectable password.
- (c) **Reset of Functions** - User shall be provided with capability of resetting PEAK, STEL and TWA readings in the field.
- (d) **Measurement Units** - Unit shall be capable of displaying both types of installed gas sensors and measurement units for each gas.

E4.7 Instrument Alarms

- (a) **Motion Alarm Feature** - Instrument shall offer motion alarm feature. When activated, instrument shall go into latch alarm when no instrument movement is detected for 30 seconds.
- (b) **Alarm Feature** - Instrument shall have an alarm feature to allow users to manually activate all alarms if situation requires.
- (c) **Visual Alarms** - Visual alarms shall consist of bright, flashing LEDs on top and bottom of instrument and positive indication on unit's display for alarm type identification.
- (d) **Audible Alarm** - Audible alarm shall be rated at > 95 dB @ 1 ft (30 cm).
- (e) **Vibrating Alarm** - Unit shall be offered with standard vibrating alarm.
- (f) **LEL Latching Alarm** - Combustible channel shall have non-resettable latching alarm when combustible gas level exceeds 100% LEL or 5.00% CH₄.
- (g) **Oxygen Alarms** - Oxygen channel shall have alarm set points for both oxygen deficiency and oxygen enrichment.
- (h) **Alarm Set Points** - Alarm set points shall be user-settable.
- (i) **STEL and TWA Alarm** - Instrument shall provide audible, visual and vibrating alarms if STEL or TWA levels are exceeded.
 - (i) User shall be able to select alarm set points for STEL and TWA.
- (j) **Battery Alarms** - Instrument shall provide user with 10-minute warning of battery power loss in all environmental conditions.
 - (i) Power consumption alarms shall activate audible, visual and vibrating alarms.

E4.8 Instrument Power

- (a) **Run Time** - Instrument continuous run time shall be 24 hours; when there is an active Bluetooth connection between the detector and multi-gas detector connect, run time shall be 22 hours.
- (b) **Power Supply** - Instrument shall be equipped with a rechargeable battery.
- (c) **Battery Life Indication** - Monitor shall provide icon depicting estimated remaining battery operation time. Battery icon must always be visible when instrument is powered on.
- (d) **Charging Cradle** - Charging cradle shall be available.
- (e) **Charger Input Voltages** - Chargers shall be available for 110VAC/220VAC and 12-24VDC.
- (f) **Charging Status** - Instrument or charging cradle shall provide visual indication of battery charging status.

E4.9 Calibration

- (a) **Calibration Tools** - Unit shall require no special tools for calibration other than calibration cap, cylinder, regulator, and tubing to supply gas to instrument.
- (b) **Pushbutton Calibration** - Calibration shall be easily performed using instrument's pushbuttons. Internal instrument access or tools shall not be necessary for calibration.
- (c) **Calibration Cylinder Mix** - Calibration gas cylinders shall be offered in standard four-gas configurations:
 - (i) Combustible, O₂, CO and H₂S

- (ii) Combustible, O₂, H₂S and SO₂
- (iii) Combustible, O₂, CO and NO₂
- (iv) Instrument shall be calibrated using one cylinder.
- (d) **Calibration Time** - Span calibration shall not exceed 60 seconds.
- (e) **Automatic Calibration** - Instrument shall be compatible with automated test and calibration system that is able to store data.
 - (i) External system shall automatically recognize and calibrate instrument and retain all calibration records.
- (f) **Bump Test Station** - Economical bump test station shall be available to verify field performance.
 - (i) Test station shall be capable of checking performance of the instrument and store records.

E4.10 Sampling Systems

- (a) **Sampling Mode** - In addition to standard diffusion mode, instrument shall be available with external powered pump probe option.
- (b) **Sampling System Filters** - Pump shall contain user-replaceable filters to prevent liquid and dust ingress.
- (c) **Sample Line Length** - Instrument shall be capable of sample draw from up to 50 ft (15 m) away.
- (d) **Fluid Ingress Protection** - Sample probe shall prevent water and debris from entering instrument.

E4.11 Data logging (Instrument Data Storage)

- (a) **Data Logging** - Instrument shall be available with standard data logging.
- (b) **Event Log** - Instrument shall record at least 500 events.
- (c) **Data Log Capacity** - Data log shall record and store data for an average of 50 hours (at one-minute intervals) without overwriting existing information in normal use.
- (d) **Gas Record Content** - Data log entries shall contain as minimum date, time and record of peak and average readings for each gas sensor (oxygen shall be recorded as maximum and minimum intervals).
- (e) **Atmospheric Record** - Instrument shall have provisions to record atmospheric temperature changes.
- (f) **Record Intervals** - Time span between data records shall be user-selectable from 15 seconds to 15 minutes.
- (g) **Data Retention** - Instrument data stored in memory shall not be lost or corrupted in event of sudden instrument power loss.
- (h) **Activity Record Content Page** - Instrument data log shall record and be capable of reporting significant instrument events including:
 - (i) Gas and battery alarms;
 - (ii) Fresh air setups, sensor re-zeroing and calibrations;
 - (iii) Battery voltage and elapsed run time;
 - (iv) Reset of PEAK, Min, STEL, and TWA values.

E4.12 Environmental and Durability

- (a) **Drop Test** - Can survive 25+ consecutive 4-ft (1.2 m) drops (MIL-STD-810G drop test). Can survive incidental 25-ft (7.62-m) drop onto concrete.
- (b) **Operating Temperature**
 - (i) Normal Operation: -10C to 40C;
 - (ii) Extended: -40C to +60C.

- (c) **Humidity**
 - (i) 15-90% RH (non-condensing) continuous;
 - (ii) 5-95% RH (non-condensing) Intermittent.

E4.13 Certifications

- (a) North America - USA / Canada CSA
 - (i) Class I, Division 1, Groups A, B, C & D
 - (ii) Class II, Division 1, Groups E, F & G
 - (iii) Class III, Division 1
 - (iv) Ambient temperature: -40°C to +54°C; T4
 - (v) CAN/CSA C22.2 No. 152 Combustible Gas Detection Instruments
 - (vi) C22.2 No. 152 Performance Ambient Temperature: -20°C to +54°C; T4
 - (vii) C22.2 No. 157 Intrinsic Safety Ambient Temperature: -40°C to +54°C; T4
 - (viii) **IEC** - IECEx Ex ia da IIC T4 Ga, -40°C to +60°C, IP68
- (b) **Manufacturing System Quality Approvals** - Instrument manufacturer must be certified as compliant with ISO 9001 provisions.

E4.14 Warranty

- (a) **Consumables** - Instrument shall have 4-year warranty on all components, including sensors and battery.
- (b) **Extended Warranty** - Extended warranty shall be offered for an additional year (five years total).

E5. BUMP / CALIBRATION STATIONS

E5.1 Test Stand

- (a) **Size** - Test stand shall not exceed 11.80" H (299.72 mm), 6.50" W (165.10 mm), 7.90" D (200.66 mm).
- (b) **Weight** - Weight shall not exceed 3.6 lbs, (1,6 kg).
- (c) **Case Material** - Test stand shall be high-strength, non-corrosive acrylonitrile butadiene (ABS).
- (d) **Display Location** - Touch screen display shall be visible from the front.
- (e) **Total Power Consumption** - Test stand exclusive of Smart cylinder shall use < 6.0 W.
- (f) **Desktop/Wall Mount** - System shall be mounted on desktop or wall via DIN rails.
- (g) **Display Type** - Test stand shall have a 4.3" resistive color touch screen.
- (h) **Volume** - Test stand audio response volume shall be set to user preference. Default value is medium loudness.
- (i) **Backlight** - Color touch screen backlight display level shall be set to user preference. Default value is medium brightness.
- (j) **Status LED's**
 - (i) Green light shall indicate that test stand hardware and software are fully functional.
 - (ii) Blinking green light shall indicate that test stand is performing user specified test or data log download.
 - (iii) Blinking yellow light shall indicate that test stand is in error and cannot be used for gas detector testing.
 - (iv) Red light shall indicate that last calibration or bump test failed.

E5.2 Smart Cylinder Holder

- (a) **Size** - Smart cylinder holder shall not exceed 11.80" H (299.72 mm), 6.50" W (165.10 mm), 6.10" D (154.94 mm).

- (b) **Weight** - Weight shall not exceed 3.5 lbs, (1,6 kg).
- (c) **Case Material** - Smart cylinder holder shall be high-strength, non-corrosive ABS.
- (d) **Desktop/Wall Mount** - System shall be mounted on desktop or wall via DIN rails.
- (e) **Status LED's**
 - (i) Green shall indicate that cylinder is completely functional and that gas parameters are within pressure and expiration date limits.
 - (ii) Yellow shall indicate low calibration gas, or that gas is nearing its expiration date.
 - (iii) Blinking yellow light band shall indicate hardware problem with cylinder holder.
 - (iv) Red shall indicate empty calibration gas cylinder, or that gas has expired.

E5.3 Multi-unit Charger

- (a) **Size** - Multi-unit charger shall not exceed 11.80" H (299.72 mm), 6.50" W (165.10 mm), 6.44" D (163.58 mm).
- (b) **Weight** - Weight shall not exceed 2.9 lbs, (1,3 kg).
- (c) **Case Material** - Multi-unit charger shall be high-strength, non-corrosive ABS.
- (d) **Desktop/Wall Mount** - System shall be mounted on desktop or wall via DIN rail.
- (e) **Status LED's**
 - (i) Green shall indicate that unit is fully charged or that no unit is inserted.
 - (ii) Red shall indicate that unit is charging.

E5.4 System Features

- (a) **Network Accessibility** - Two Ethernet interfaces shall be provided at rear of bump station.
 - (i) Ports shall allow for connection and communication distribution between multiple test stands.
 - (ii) If networking to computer, 1 USB port on master test stand is used to communicate with the software application.
- (b) **Fleet Management Software** - Software shall be available to proactively manage the gas detection program.
 - (i) Conditions such as exposure alarms, overdue testing and many other system conditions can be monitored live.
 - (ii) Reports can be generated and either printed or saved.
 - (iii) System also can directly email end users of these conditions.
 - (iv) Ethernet connection must be established to transmit data log data to the software.
- (c) **Stand-Alone System** - Shall be capable of operating without network, controller or computer.
- (d) **Instrument Configuration** - Each test stand has the ability to configure set points for gas detector system. Items such as alarm setpoints, datalogging setup and sensor configuration can be set via test stand user interface.
- (e) **Instrument Always Ready** – 4 Gas Multi-Gas detector and 5 Gas Multi-Gas Detector can "wake up" and be calibrated within bump station test stand; units then go back to sleep in charge mode, awaiting use or next scheduled test interval.
- (f) **Charging** - Each multi-gas detector test stand must provide for charging 1 detector. Multi-unit chargers are also available for 4 Gas Multi-Gas Detectors and 5 Gas Multi-Gas Detectors.
- (g) **Interconnectivity** - Up to 10 specific test stands and 4-cylinder holders must be able to interconnect and to perform 10 simultaneous tests.
- (h) **Smart Cylinder Holder** - In-line electronic cylinder holder must be available. Up to 4-cylinder holders shall be able to interconnect within system. Smart cylinder holder to

provide RFID tag recognition of calibration gas cylinder, providing calibration gas part number, gases, concentrations, lot number, and expiration date.

- (i) Smart cylinder holder shall also provide demand flow regulator with digital pressure interface, displaying pressure at test stand.
- (j) **Cylinder Holder** - In-line cylinder holder shall be available. Up to 4-cylinder holders shall be able to interconnect within the system.
- (k) **Printer** - System must have ability to print to printer connected directly to test stand and to print calibration stickers or bump/calibration receipts. Receipt format includes embedded calibration sticker.
- (l) **Data Access** - Instrument communications under test to test stand shall be non-intrusive using infrared link communications. Data logs shall be downloaded from portable gas detectors and relayed via bump station test stand and an Ethernet connection. Test stand data such as overdue testing shall be directly downloaded onto USB drive from bump station test stand.
- (m) **USB Drive Test** - Stand shall provide data access via USB port on side of test stand. Feature can be disabled to prevent external access into system.

E5.5 Sampling System

- (a) **Gas Delivery System** - System shall be capable of automatically drawing calibration gas from cylinder through demand flow regulator.
- (b) **Pump Test** - Test stand shall provide capability to automatically test pump for flow and proper operation.
- (c) **Cylinder Test** - Test stand shall provide capability to automatically determine if calibration gas cylinder is empty.
- (d) **Sampling System Filters** - System pump shall have easily accessible replaceable filters for user replacement.

E5.6 Advanced Software Features

- (a) **Licensing** - Software shall be provided via digitally keyed USB drive. Every running instance of the software shall require a USB software key to be inserted in USB port.
 - (i) Cloud hosting charges shall be included in the licensing fee.
- (b) **Installers** - Installers shall be provided via USB software key or web download.
- (c) **Dashboard System Status** - Dashboard shall provide view of the current system status including number and type of alarm events, calibration gas status and any failed or overdue testing.
- (d) **Data Management** - Access to data (gas sensor data, gas alarms and system events) shall be provided by the software via reporting screens. Data is stored using any version of Microsoft SQL Server 2008; SQL Server Express 2008 R2 is installed with the software as default. Reports can be printed to 8.5x11" or A4 format. Data can be saved as a PDF, Excel file or .csv file.
- (e) **Remote Management of Bump Station Test Stand Banks** - Bump station test stand configuration properties shall be capable of being changed and saved remotely via an ethernet connection and the software system. Changes shall be capable of being propagated to one whole bank or individual test stands.
- (f) **Instrument Configuration** - Instrument configurations shall be capable of being created in the software and transferred via secure digital USB key to the bump station test stand bank.
- (g) **Fleet Management** - New instruments shall be added to the database automatically when docked with a bump station test stand. Instruments no longer in service shall be removed via the software fleet management screen.
- (h) **Email Notifications** - System shall be capable of being configured with email lists to automatically email alerts to safety and management personnel for a select list of gas alarms and system events.

E5.7 System Power

- (a) **Test Stand** - Power module input power requirements: 100 – 240 VAC, 47 – 63 Hz. Several different prong types shall be available for worldwide AC sockets.
 - (i) Vehicle module 12/24 VDC (for use in cigarette lighter socket) shall be available.
- (b) **Smart Cylinder Holder** - Draws power from bump station test stand.
- (c) **Multi-Unit Charger** - Power module input power requirements: 100 – 240 VAC, 47 – 63 Hz. Several different prong types shall be available for worldwide AC sockets.
 - (i) Vehicle module 12/24 VDC (for use in cigarette lighter socket) shall be available.

E5.8 Certifications

- (a) **Manufacturing System Quality Approvals** - Instrument manufacturer shall be certified as ISO-compliant.

E5.9 Environmental

- (a) **Operating Temperature** – Operating temperature shall be 0-40° C

E5.10 Warranty

- (a) **Warranty** – System shall have 2-year warranty on all components. Calibration sticker and receipt printer shall have 1-year warranty.

E6. AREA MONITORS

E6.1 Area monitor shall:

- (a) Be 4-gas detection with a catalytic bead sensor;
- (b) Be of a compact and portable design;
- (c) Have a long battery life with 50-60 days of 4-gas runtime (80 or more days as toxic & O2);
- (d) Be easy to setup and have factory pre-configured networks that are ready to go out of the box;
- (e) Have available an App compatible with Android mobile phones; App shall be easy to configure and setup;
- (f) Connect up to 32 area monitor gas detectors with HUB to form mesh network, share alarms, and extend range;
- (g) HUB connects with compatible software via WIFI or ethernet connectivity;
- (h) Integrated D-ring and 50 lbs (22 kg) magnet to provide placement options;
- (i) IP68 ingress rating ensuring durability and toughness to withstand submersion, sprays and weather conditions;
 - (i) Durability: Drop tested from 10 ft. (3m);
- (j) Weigh approximately 1.6 lbs (0.7 kg), with dimensions of approximately 5.2" x 5.6" x 2.7" (132 x 142 x 69 mm)

E6.2 Operating Temperature

- (a) Normal Operating: - 4° to 131° F (- 20° to 55° C)
- (b) Extending Operating: - 40° to 131° F (- 40° to 55° C)
- (c) Storage: 32 to +95 °F (0 to 35 °C)

E6.3 Humidity

- (a) Intermittent: 5% - 95%
- (b) Non-condensing: 15% - 90%

E6.4 Power Supply

- (a) Batteries: 3 replaceable lithium thionyl chloride batteries;
- (b) Runtime:
 - (i) Nominally 50-60 days 4-gas;
 - (ii) 80-85 days without combustible sensor.

E6.5 Alarms

- (a) Audible: 90 dB at 1 ft. (0.3 m)
- (b) Visual: RGB LED

E6.6 Data Logging

- (a) Periodic, event, instrument and calibration logs shall be stored on detector (for at least 2 months) and sent to the compatible software.

E6.7 Range

- (a) Up to 1000 ft. (~300 m) line of site, HUB to detector;
- (b) 2 mesh hops to extend range.

E6.8 Radio

- (a) 915 MHz, Bluetooth, RFID

E6.9 Sensors

- (a) Gas Range Resolution
 - (i) LEL 0-100% 1%
 - (ii) O₂ 0-30% 0.1%
 - (iii) CO 0-1999 ppm 1 ppm
 - (iv) H₂S 0-200 ppm 1 ppm

E6.10 Warranty

- (a) Instrument: 4 years
- (b) Oxygen Sensor: 2 years
- (c) Low-energy Combustible: 1 year

E7. SOFTWARE

E7.1 Software shall be a cloud-based software platform for managing products, people and processes.

E7.2 Monitoring:

- (a) Shall be capable of actively monitoring firefighter status and coordinate emergency incidents both locally and remotely;
- (b) Shall be capable of monitoring air quality in flammable and toxic atmospheres.

E7.3 Reports:

- (a) Shall have after-action data from fire scenes automatically stored and aggregated for report generation and data analytics.

E7.4 Maintenance:

- (a) Shall have configuration and firmware versions of instruments and devices updated and managed via the companion mobile app.

E7.5 Inventory Management:

- (a) Shall be capable of managing inspection status, overhaul, and active work orders of all their fire service products (instruments and devices).

E7.6 Connection:

- (a) Shall allow instrument and devices to connect and communicate with each other.

E7.7 Mobile App and Web Platform:

- (a) Mobile App shall provide the ability to configure devices (hardware), update firmware and transmit data log.
- (b) Web Platform shall be for remote monitoring and inventory management.

E8. APPROVED PRODUCTS

E8.1 Subject to E1.2, the following products are approved;

- (a) 5 Gas Multi-Gas Detector – MSA Altair 5X Gas Detector
- (b) 4 Gas Multi-Gas Detector – MSA Altair 4X Gas Detector
- (c) Bump/Calibration Stations – Galaxy GX2
- (d) Area Monitors – MSA Altair iO 360 Detector

E9. APPENDIX A – 5 GAS MULTI-GAS DETECTOR: GAS SENSING OPTIONS

Gas type	Range	Resolution
Combustible	0-100%LEL 0-5%Vol	1%LEL 0.05%Vol
Oxygen	0-30%Vol	0.1%Vol
Carbon monoxide	0-2000 ppm	1 ppm
Carbon Monoxide	0-10,000 ppm	5 ppm
Hydrogen sulfide	0-200 ppm	1 ppm
Hydrogen sulfide	0-100 ppm	0.1 ppm
Sulfur dioxide	0-20 ppm	0.1 ppm
Chlorine	0-10 ppm	0.05 ppm
Ammonia	0-100 ppm	1 ppm
Nitrogen dioxide	0-20 ppm	0.1 ppm
Nitrogen dioxide	0-50 ppm	0.1 ppm
Chlorine dioxide	0-1 ppm	0.01 ppm
Phosphine	0-5 ppm	0.1 ppm
Hydrogen cyanide	0-30 ppm	0.1ppm
Carbon dioxide, CO2	0-10%Vol	0.01%Vol
Butane, C4H10	0-25%Vol	0.1%Vol
Methane, CH4	0-100%Vol	1%Vol
Propane, C3H8	0-100%Vol VOC 0-2000 ppm	1%Vol 0.1 ppm

E10. APPENDIX B – 5 GAS MULTI-GAS DETECTOR: CALIBRATION TIME

Gas Type	Span Time
Chlorine	2 minutes
Ammonia	2 minutes
Nitrogen dioxide (Series 20)	4 minutes
Chlorine dioxide	6 minutes
Phosphine	4 minutes
Hydrogen cyanide	4 minutes

E11. APPENDIX C – 5 GAS MULTI-GAS DETECTOR: TYPICAL T (90) RESPONSE TIMES

Combustible sensor	< 10 seconds (methane)
	< 15 seconds (pentane)
Oxygen sensor	< 10 seconds
CO sensor	< 15 seconds
H2S sensor	< 15 seconds
NH3 sensor	< 40 seconds
SO2 sensor	< 10 seconds
NO2 sensor	< 15 seconds
Cl2 sensor	< 30 seconds
IR CO2	< 35 seconds
IR CH4	< 34 seconds
IR C4H10	< 35 seconds
PID 10.6eV 2000ppm	< 10 seconds

E12. APPENDIX D – 4 GAS MULTI-GAS DETECTOR: SENSOR TYPES

Gas type	Range	Resolution
Combustible	0-100%	LEL 1% LEL
	0-5% Vol CH4	0.05% Vol CH4
O2	0-30% Vol	0.1% Vol
CO	0-1999 ppm	1 ppm
H2S	0-200 ppm	1 ppm
H2S Low Concentration	0-100 ppm	0.1 ppm
SO2	0-20 ppm	0.1 ppm
NO2	0-50 ppm	0.1 ppm

E13. APPENDIX E – 4 GAS MULTI-GAS DETECTOR: TYPICAL T (90) RESPONSE TIME

Combustible sensor	< 10 seconds (methane)
	< 15 seconds (pentane)
O2 sensor	< 10 seconds
CO, H2S, SO2 & NO2 sensors	< 15 seconds