National Defence | Défense nationale

National Defence Headquarters
Ottawa, Ontario

Quartier général de la Défense nationale
Ottawa (Ontario)

**BIDDERS' CONFERENCE AGENDA**
**Fourier Transform Infrared (FTIR) Spectrometer based Aviator's Breathing Oxygen Test Systems**
**W8486-195218/B**

27 February 2023, 2:00PM EST
MS Teams Meeting ID: 223 313 718 974
Passcode: wzJAxU

## I. Call to Order

The meeting began at 2:00PM EST.

## II. Introduction

- It is forbidden to record this session
- Minutes will be publicly available on Canada Buys

DND members introduced their name and position to the suppliers.

## III. Attendance

- Please submit your name, position and contact information. You may send this directly in the meeting chat or if you prefer, you may directly email the contracting authority, Myriam Zakaib, myriam.zakaib@forces.gc.ca

Department of National Defence
- Myriam Zakaib, DLP Contracting Authority
- Benoit Patry, QETE Technical Authority
- Frédéric Bernatchez, QETE Superintendant
- Julianne Eng, DLP Team Lead

Thermo Fisher Scientific
- Erik Haddadine, Canada Sales Representative
- Jay Roberts, Product Manager, FTIR Gas Analysis systems
- David Drake, Senior Project Manager
- Gary Veitch, Sr. Service Manager

Levitt Safety/Gasmet
- Josh Lefrancois, Fed Gov't Account Manager
- Norm Dean, Instrumentation Manager
- Jonathan McCallum, Market Segment Manager
- Jim Cornish (Gasmet), Account Manager

## IV. Presentation

- Presentation by the technical authority

The technical authority presented a short PowerPoint presentation. The slides are attached.

## V. Questions

- Questions may be asked verbally but we ask that you also send them in writing in the chat.

The questions and answers have been added to the Q&A document.

## VI. Adjournment

The meeting concluded at 2:48PM EST.

National Defence / Défense nationale

SOUS-MINISTRE ADJOINT (MATÉRIELS) · ASSISTANT DEPUTY MINISTER (MATERIEL)

CENTRE D'ESSAIS TECHNIQUES DE LA QUALITÉ · QUALITY ENGINEERING TEST ESTABLISHMENT

# Bidders Conference Presentation; W8486-195218/B Fourier Transform Infrared (FTIR) Spectrometer based Aviator's Breathing Oxygen Test Systems



Canada

# Introduction

- Background to the Royal Canadian Air Force (RCAF) requires the ongoing use of aviator's breathing oxygen (ABO)
- The Quality Engineering Test Establishment support to the ABO program.
- The current status and requirement for new FTIR fleet of ABO analysers.
- Bidder's conference questions submitted / answers

# Background

- The Royal Canadian Air Force (RCAF) requires the ongoing use of aviator's breathing oxygen (ABO) to support flight operations of various aircraft fleets.

- Due to extreme stresses experienced by aviators, there is a stringent requirement with respect to purity (>99.5%), moisture content (<7 ppm) and other trace contaminants in aviator's breathing oxygen for military aircraft.

- The RCAF requires on-site acceptance testing of all ABO liquid oxygen (LOX) delivered to the RCAF.

- Testing of gaseous ABO samples taken at various transfer steps (aircraft reservoirs, transport cylinders etc.) is also required to ensure contaminants are not introduced or that related ABO handling equipment is not failing.

# Background (Cont.)

The Quality Engineering Test Establishment (QETE) provides scientific and technical support to the RCAF Aviator's Breathing Oxygen (ABO) program on various levels:

- **Scientific and technical support of RCAF LOX testing facilities, in Canada and in deployed operations.**

- Coordination of the ABO testing performance evaluation program for the participating Canadian laboratories (international interlaboratory proficiency testing program).

- Scientific and technical advice and assistance to RCAF on $O_2$ topics:

  - Oxygen system failure/ hypoxia incidents investigation.
  - Enriched oxygen systems cleaning.
  - Enriched oxygen materials compatibility evaluation. (Ex: Fire hazard)

# Scientific and technical support of LOX testing facilities

Presently: FTIR based ABO analysers are located at 3 RCAF Bases and available to support deployed flight operations:

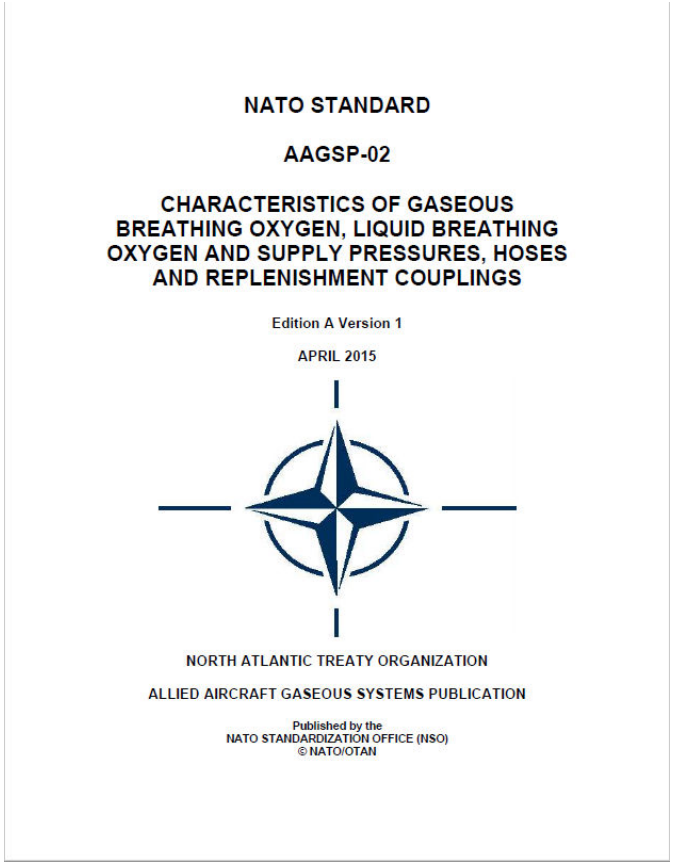
- 3rd Wing Bagotville, QC
- 4th Wing Cold Lake, AB
- 8th Wing Trenton, ON

+ QETE in Gatineau, QC


New 2023: 19th Wing Comox, BC

# Scientific and technical support of LOX testing facilities (cont.)

Testing is performed to ensure the aviators breathing oxygen meet the specifications stated in NATO and National publications:



NATO STANDARD

AAGSP-02

CHARACTERISTICS OF GASEOUS BREATHING OXYGEN, LIQUID BREATHING OXYGEN AND SUPPLY PRESSURES, HOSES AND REPLENISHMENT COUPLINGS

Edition A Version 1

APRIL 2015

NORTH ATLANTIC TREATY ORGANIZATION

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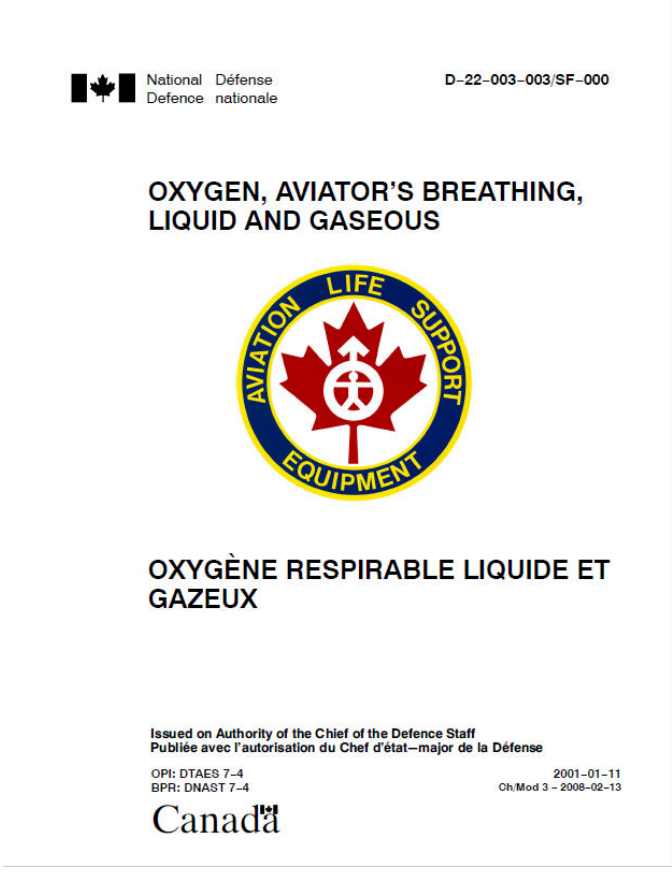

National Défense
Defence nationale

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OXYGEN, AVIATOR'S BREATHING, LIQUID AND GASEOUS

OXYGÈNE RESPIRABLE LIQUIDE ET GAZEUX

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Canada

# Scientific and technical support of LOX testing facilities (cont.)

From NATO AAGSP-02:

**Appendix 1 to Annex A – Table 1 of NATO Standard AAGSP-02**

Extracted from NATO Standard AAGSP-02 (SOW Reference 2.1 (c)) on 02 Dec 2019 in accordance with copyright and use of NATO content conditions specified at https://www.nato.int/cps/en/natohq/79511.htm, with modifications made to meet DND's specific ABO Testing Program requirements. Maximum allowable concentration for minor contaminants in liquid oxygen (oxygen is supplied in liquid format and converted to gas phase for minor contaminants testing by FTIR).

| **Extracted from Table 1 of NATO Standard AAGSP-02<br>Limits for Minor Contaminants in Liquid and Gaseous Breathing Oxygen** | |
|---|---|
| **Contaminant<br>(see Note 1)** | **Maximum Limit (ppm by volume) Liquid Oxygen (Type II)<br>(see Note 2)** |
| Water | 7.0 |
| Carbon dioxide ($CO_2$) | 5.0 |
| Methane ($CH_4$) | 25.0 |
| Acetylene ($C_2H_2$) | 0.050 |
| Ethylene ($C_2H_4$) | 0.20 |
| Ethane and higher hydrocarbons (as ethane) ($C_2H_6$) | 3.0 |
| Nitrous oxide ($N_2O$) | 2.0 |
| Sum of Halogenated compounds<br>(see Note 3) | 1.00 |
| Sum of Solvents<br>(see Note 4) | 0.10 |
| Sum of Other Contaminants<br>(see Note 5) | 0.10<br>(See Notes 6, 7 & 8) |
| | This column also indicates the required significant digits to be retained for reporting each compound. |

# Scientific and technical support of LOX testing facilities (cont.):

Since the 1980's QETE:

- Selects, modifies, implements FTIR gas analysis analytical methodologies, parameters and instrumentation for the determination of trace impurities in ABO.
- Provides instructions, training, technical and troubleshooting support to RCAF operators, on site and/or remotely.
- The FTIR gas analysers are operated by non scientific staff, uniformed RCAF personnel; aircraft structures technicians (ACS) with no formal training in science or chemical analysis.

Benchtop FTIR ABO analyser

# Current status and requirement for new FTIR fleet of ABO analysers.

- Currently using an aging fleet of FTIR gas analysers (~17 years old) acquired as an accessory to deployable liquid oxygen generators.

# Solicitation No W8486-195218/B
## Questions / Answers

1. HFE Components (Annex A, Appendix A) – We include the Freons and HCFC in our ABO calibration, but HFE will be new. The spec calls for "HFE: HFE-7100, CFC" which covers a broad class of solvents. Is it sufficient to include HFE-7100 as representative of all the HFE's?

   Yes

2. Accurate quantitative analysis requires measurement of the sample gas pressure with a pressure transducer. There is no specific mention of a pressure transducer in the RFP. It is possible for the DND to provide their own pressure transducers, but we plan to offer our FTIR system with a pressure transducer.

   DND will not provide a pressure transducer. It is up to the manufacturer to provide a system equipped with all the required components to allow the system to meet the analytical performance requirements listed in the RFP. If a pressure transducer is required by system design, then it must be provided by the manufacturer.

# Solicitation No W8486-195218/B Q / A (cont.)

3. Section 3.1.8 (i) specifies that the "Contractor must supply a fit for purpose gas supply regulator and a compatible flexible gas line…" Does this include the regulator mounted onto the gas cylinders, or simply an in-line regulator after the ¼" Swagelok input? If regulators are required for the gas cylinder(s), we need the specification for each required cylinder (single stage or double stage? Chemical compatibility? Brass vs stainless? Regulator thread).

   As the type of compressed gases required to operate the system may be design dependent, it is up to the manufacturer to provide the required gas regulators and flexible gas lines. For example, if ultra-high purity UHP nitrogen from a compressed gas cylinder is required to perform a background or zeroing the instrument, a CGA 580 high purity gas regulator must be provided. If the system requires other specific gases to operate, the appropriate regulators must be provided. Important: as the samples will be high purity oxygen (aviator's breathing oxygen) from high pressure (1000 to 2500 PSI) compressed gas cylinder, an appropriate high purity CGA-540 regulator must be provided to connect the sample cylinder to the system, brass is the preferred material for high pressure oxygen compatibility issues.

4. Our bid will include shipping cases for the (1) FTIR/sample system, plus (2) purge gas generator. Is a 3rd shipping case required for sample/validation gas cylinders?

   The RFP requirement does not include a requirement for shipping cases for compressed gas cylinders.

# Solicitation No W8486-195218/B
# Questions / Answers

5. Section 3.1.10 Laptop PC Requirements specifies a Windows 10 Pro operating system. Is a Windows 11 system suitable?

   Windows 11 operating system is acceptable.

6. Attachment 1 to Part 3, Table 2b: Replacement Parts calls for qty 10-each of 3 different parts (laser, infrared source, and detector). We strongly recommend the detectors be packaged for long-term storage as per MilSpec 2073 Packaging

   This is a comment, not requiring an answer.

7. Commissioning and user training will require support from US citizens. Please advise how to proceed to gain security clearance to come on-site to Canadian DND sites.

   The process for security assurances for foreign personnel is explained on the Government of Canada website for the Public Services and Procurement Canada's (PSPC) Contract Security Program (CSP) for international contract security requirements: https://www.tpsgc-pwgsc.gc.ca/esc-src/international-eng.html

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## Questions / Answers

8. With respect to section 6.4.2 Supplemental General Conditions: please either remove 4004 (2013-04-25) Maintenance and Support Services for Licensed Software from section 3.3 and section 10; or modify as was done in previous public works contracts as per below:
The 4004 (2013-04-25), Maintenance and Support Services for Licensed Software Section 02, subparagraph 3; are modified as follows:
Delete: 4004 (2013-04-25) Section 02, sub-paragraph 3 Insert:
"Severity 1": Within seventy-two (72) hours of notification by Canada;
"Severity 2": Within seven days (7) days of notification by Canada;
"Severity 3": Within fourteen (14) days of notification by Canada;
"Severity 4": Within ninety (90) days of notification by Canada.

It currently states (Section 4.4004 - Maintenance and Support Services for Licensed Software - Buyandsell.gc.ca)
"Severity 1": within twenty-four (24) hours of notification by Canada;
"Severity 2": within seventy-two (72) hours of notification by Canada;
"Severity 3": within fourteen (14) days of notification by Canada;
"Severity 4": within ninety (90) days of notification by Canada.

Changes to the severity 1 and 2 support response times are accepted.

# Solicitation No W8486-195218/B

## Questions / Answers

9. What gas and concentration in ppmv is the certified reference standard gas mixture referenced in 3.1.8 (c) & 3.1.8 (e) as shown below?

3.1.8. Performance and Physical Requirements: the ABO Test Systems must deliver, enable and support the following performance specifications and physical parameters:

(a) Must use FTIR spectroscopy technology.

(b) Detector: Detector must not require the need for cryogenic liquid cooling. Thermoelectric cooling (Peltier) is acceptable.

(c) Quantitative analysis relative accuracy: between 80% and 120% when compared against the concentration of a certified reference standard gas mixture at the concentrations listed in 3.1.7.

(d) The system must be factory calibrated for the quantitative analysis of all the compounds of interest at appropriate calibration ranges to meet the requirements of 3.1.8 (c). The system must not require user re-calibration of the target compounds listed in 3.1.7. A factory re-calibration of this target compound list must be required only in the event of major repairs performed at the factory.

(e) Quantitative analysis repeatability: ± 5% $RSD_r$ between replicates of a certified reference standard.

The system must be able to provide accurate quantitative analysis results for the aviator's breathing oxygen trace contaminants potentially present, at the concentrations described in 3.1.7 and detailed in Appendix 1 to Annex A of the RFP. A certified reference standard gas mixture could be a commercially available certified custom made gas mixture with any combination of compounds (one or multiple) at concentrations near their respective maximum allowable concentration for minor contaminants in aviator's breathing oxygen listed in Appendix 1 to Annex A – Table 1 of NATO Standard AAGSP-02. Please note that at 3.2.2.5. Acceptance Testing, such a certified gas mixture could be used to verify the quantitative analysis accuracy performance of the system.

# Solicitation No W8486-195218/B

## Questions / Answers

10. Do the testing sites have access to a cylinder of high purity inert gas such as nitrogen, helium or argon that would negate the use of a nitrogen generator?

Test sites will have access to commonly available compressed gas cylinders such as UHP Nitrogen via the Canadian compressed gas suppliers such as and not limited to Linde, Messer, Air Liquide, etc.

However compressed gas cylinders shall not be considered as equivalent to purge gas generators if a purge gas is required by instrument design to continuously purge, for example the FTIR optics bench.

If instrument design requires purge gas flows low enough to permit infrequent changes of purge gas compressed cylinders, then it could be acceptable to provide a system without a purge gas generator/compressor. Cryogenic sources of purge gas such as liquid nitrogen are not acceptable. As a typical K (Linde) or 50 ( Air Liquide) size compressed gas cylinders contains approx. 8.44 $m^3$ of nitrogen at 2640 psi, or 8440 liters of gas, a consumption rate of smaller or equal to 0.2 l/min would require a change frequency of 1 cylinder per month, the highest change frequency that will be accepted for the purge gas source for this system.

# Solicitation No W8486-195218/B

## Questions / Answers

11. Is this a new gas testing application or are they currently testing the breathing oxygen ?

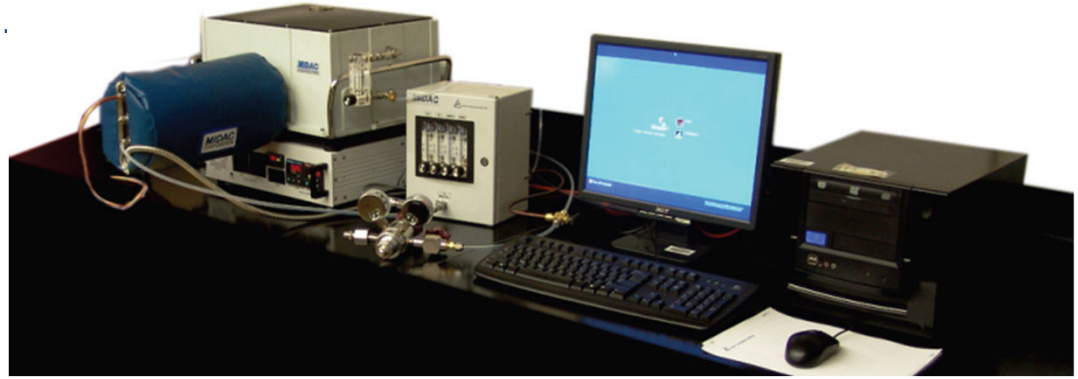
    Aviation breathing oxygen trace contaminant testing is currently being performed by the RCAF.

12. If it is not  a new application what gas technique are they currently using ?

    FTIR gas analyser.

13. If they are currently using FTIR what make and model is currently being used ? :

    Currently, the Aviator's Breathing Oxygen Testing Program includes testing by Canadian Armed Forces personnel using the MIDAC Model I1300 FTIR Spectrometer System and its associated Servomex, Model 570 Portable Oxygen Analyser at 3 Wing Bagotville (Québec), 8 Wing Trenton (Ontario), and 4 Wing Cold Lake (Alberta).  These units were manufactured over 17 years ago.



# Thank you for your attention.

4th Wing Cold Lake, AB. LOX Facility.