



Standard Operating Procedure
Air Quality Section
Department of Labour Inspection

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07/02/2011

Rev.:

1

DLI-SOP- 244 Level 2 maintenance of ozone analysers

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Prepared by:_____ Date:_____


Reviewed by:_____ Date:_____

Approved by:_____ Date:_____

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Purpose

To describe the procedure to be followed for performing special maintenance and calibration of the EC9810 Ozone analysers in the monitoring network.

Principle

This SOP applies to EC9810 Ozone analysers.

Staff involved

This SOP is intended for the staff of the maintenance company who performs the activities described.

Equipment


- Ozone monitor (Ecotech EC9810)
- Station data processor (Ecotech)

Documentation and forms

This SOP requires the form *DLI-F-39 O3 Analyser Maintenance Report*.

The completed form is stored in electronic form in the file *DLI-F-39 O3 Analyser Maintenance Report-sn-yyyy-mm-dd.xls*, where *sn* denotes the analyser serial number, *yyyy* the year, *mm* the month and *dd* the date of the maintenance.

The paper copy of the form is stored in the history log book of the analyser.

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Procedure

General

Perform the scheduled maintenance as required by the maintenance schedule DLI-QD-103.

Registration of general information and status parameters

Registration of general information:


- Enter name of customer, analyser model, analyser serial number and job number in **Customer, Instrument, ID No. and System/Job No.** fields respectively.
- Enter name of operator, date of test, start time and where the test was performed in **Maintenance Performed by, Date, Time Begin** (left field) and **Location** fields respectively.

Registration of reference information (section Calibration Equipment, where applicable):

- Enter flow calibrator model, calibrator serial number, pressure calibrator model and calibrator serial number in **Flow Calibrator Model, ID/Serial No., Pressure Calibrator Model and ID/Serial No.** fields respectively.

Registration of analyser status parameters (section Displayed Instrument Parameters):

- On the analyser keyboard hit **<Exit>** to return to the primary screen.
- Push the **Select** button to enter the main menu. Use the **Up** and **Down** arrows on the keyboard to navigate in the main menu. Push **<Return>** to select a menu item.
- Choose **INSTRUMENT STATUS**.
- From the **INSTRUMENT STATUS** menu read the status parameters and enters them into their respective fields in the **Displayed Instrument Parameters** section of the form.
- Hit **<Exit>** to return to the primary screen.
- Hit **Select** to enter the main menu, choose **SYSTEM TEMPERATURES**.
- From the **SYSTEM TEMPERATURES** menu read the status parameters and enters them into their respective fields in the **Displayed Instrument Parameters** section of the form.
- Hit **<Exit>** to return to the primary screen.
- Hit **Select** to enter the main menu, choose **TEST MENU**.
- In the **TEST MENU** choose **OUTPUT TEST** menu.
- In the **OUTPUT TEST** menu choose **PREPROCESSOR POTS**.
- From the **PREPROCESSOR POTS** menu read the status parameters and enter them into their respective fields in the **Displayed Instrument Parameters** section of the form.
- Hit **<Exit>** to return to the primary screen.

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- From the primary screen record the measurement units in the **Instrument units** field.
- Compare the recorded values with the acceptance limits. If any values are outside the limits the cause must be investigated.

Pressure and flow calibration

The pressure and flow calibration procedure is taken from the 9810A&B Series Ozone Analyzer Service Manual. The pressure calibration menu is accessed from the hidden menu. It is assumed that the analyser has been running for at least one hour for the temperature of the flow block to stabilise at 50 °C.

To access the pressure calibration menu:


- From the primary screen press simultaneously press the keys <Up arrow> + <Pg Up> + <Enter> to enter the Hidden menu.
- From the Hidden menu, select the **PRESSURE CALIBRATION MENU**.

Pressure calibration:

- Turn off the pump.
- Disconnect the inlet tubing from the flow block and connect a calibrated pressure transducer to this inlet.
- Allow 30 seconds for the pressure reading to stabilise to ambient pressure on both the calibrated pressure transducer and the analyzer. This reading (in TORR) should be the ambient pressure. Set this value as **PRESSURE 1 HIGH** and press <Enter>. Note: to convert from millibar to TORR, multiply the pressure by 0.75.
- Enter the **PRESSURE 1 HIGH** value in the **Pressure and Flow Calibration - PRESSURE 1 HIGH** field.
- Connect the pump to the exhaust port and turn it on.
- Allow the pump to evacuate the cell and the pressure reading to stabilize. This reading should be low (typically 100 to 200 torr), and is dependent upon the capacity of the pump. Set this value as **PRESSURE 1 LOW** and press <Enter>.
- Enter the **PRESSURE 1 LOW** value in the **PRESSURE 1 LOW** field.
- Disconnect the pressure transducer from the flow control inlet and reconnect the inlet tubing.
- Continue with the flow calibration.

Flow calibration:

- From the Hidden menu, select the **FLOW CALIBRATION MENU**.
- Set the **CRITICAL ORIFICE** to 0.600 and press <Enter>.
- Press Reset on the analyzer secondary panel.
- The actual flow should now be checked by turning on the pump and connecting a flow meter to the sample inlet of the analyzer. The flow should read approximately

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0.500 slpm. If the flow is too low, perform the sintered filter/orifice replacement procedure. If flow is too high, there is probably a leak.

- Enter the observed gas flow in the **Gas flow** field.

Cleaning and replacing parts

References are made to the **Maintenance** section of the form.

Cleaning the lines:

- The pneumatic lines (sample and exhaust) may be cleaned by removing and washing with a methanol cotton swab pushed through and dried by blowing with zero air or dry nitrogen. Do not clean the scrubber.
- Enter **Y** in the **Lines cleaned** field if it was changed. Otherwise enter **N**.

Cleaning the cell tube

- Refer to chapter 3.3.4.1 cleaning the Cell Tube of the 9810 A & B Series Ozone Analyzer Service Manual for instructions on cleaning.
- Enter **Y** in the **Cell tube cleaned** field if it was changed. Otherwise enter **N**

Changing the sintered filter:

- Refer to chapter 3.3.5 Sintered Filter Replacement (B Series) of the 9810 A & B Series Ozone Analyzer Service Manual for instructions on replacement/ cleaning.
- Enter **Y** in the **Sintered filter changed** field if it was changed. Otherwise enter **N**.

UV lamp replacement

- Refer to chapter 3.3.6.1 UV Lamp Replacement of the 9810 A & B Series Ozone Analyzer Service Manual for instructions on replacement.
- Enter **Y** in the **UV lamp changed** field if it was changed. Otherwise enter **N**.


Finalizing the visit and completing the form

- Enter the end time of the calibration in the **Time Begin/End** field (right field) in the form.
- Sign the form in the **Technicians Signature** and **Date** fields.
- Before leaving the station record the visit in the station visit log.
- After returning to the lab store the form in the instrument history log book.

Relevant documentation

DLI-QD-103

Form *DLI-F-39 O₃ Analyser Maintenance Report*

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Reference Procedures

Ozone monitor (Ecotech EC9810) manual

Revision History

Revision 0