


<b>ExxonMobil</b> Baton Rouge Complex Mechanical Division	MECHANICAL PROCEDURE		Procedure #	
	Business Group Intermediates	F-160 Furnace O2 / COMB Analyzer SCD Test and Calibration PM		BRCP
	Unit Aromatics			REV: 0
	Equipment Analyzers	<b>S/H/E Critical</b>		Page 1 of 9

### 1.1 Low O2 and High Combustibles Alarm Test

- 1) Connect portable N2 cylinder to the O2 span cylinder tubing connection or if using fixed N2 cylinder valve in the N2 cylinder.
  - 2) Close the aspirator air supply valve
  - 3) Open the N2 cylinder valve.
- Using a manual sample panel, valve in O2 span and set flow to 3 SCFH.
- 4) Monitor O2 and confirm O2 value decreases.
  - 5) Verify when O2 read less than 0.01%, the following occurs:
    - \_\_\_\_\_ a) The DCS Low O2 alarm activates.
    - \_\_\_\_\_ b) The analyzer controller drives the combustibles to 100% of range.
    - \_\_\_\_\_ c) DCS High Combustibles alarm activates.
  - 6) Isolate N2 Cylinder valves.
  - 7) Open aspirator air supply valves.
  - 8) Verify if using manual calibration panel the following actions occur post lining up analyzer to process:

Verify if using auto calibration panel the following actions occur port going back to process using controller or HMI:

    - \_\_\_\_\_ a) The DCS Low O2 Alarm deactivates
    - \_\_\_\_\_ b) The analyzer controller returns the combustibles to normal output.
    - \_\_\_\_\_ c) High Combustibles alarm deactivates.

1.2 Return analyzer to process sample and allow to stabilize.

1.3 Pass/Fail criteria SCD Alarm check, mark “Pass” if:

- DCS O2 Low Alarm activates.
- DCS Combustibles High Alarm activates.
- Analyzer Fault activates.
- Analyzer Flow Fault activates.

Mark “Pass and Adjusted” if any alarms do not activate the first time and the tested is rerun post sample response time test and validation calibration and adjustment.

Mark “Failed” if adjustment and/or repairs do not mitigate issue.

If Fail – skip to analyzer response time testing otherwise get operations to write a notification.

1.4 Analyzer Response Time Testing

1. Confirm an isolation valve is installed on the aspirator vent to atmosphere.
2. Calculate T90 response.
  - a) For O2 =  $20.95 - ((20.95 - \text{process reading}) \times 0.9)$
  - b) For Combustibles =  $(\text{Cal Standard} + 500 \text{ ppm}) - ((\text{Cal Standard} - \text{process reading}) \times 0.9)$
3. Check O2 T90 Response
  - a) Close the aspirator air supply valve.
  - b) Close the valve on the aspirator atmospheric vent. This will insure cal gas will flood the transport tubing and probe.
  - c) Open the O2 Span gas valve (instrument air), set the calibration flow to 3 SCFH and allow the value to stabilize near 20.95% oxygen. If using auto calibration panel activate manual O2 span check using the Analyzer controller.
  - d) Close the O2 span gas valve.
  - e) Open valve on aspirator atmospheric vent.
  - f) Start the timer as the aspirator air supply valve is opened.

- g) Measure the response time for the oxygen reading to fall from 20.95% to T90 on process gas. Note – process may be unstable and test may have to be ran more than once if test fails.

\_\_\_\_\_ h) Record the O2 T90 response time.

- i) If necessary run the test two times record each test.

\_\_\_\_\_ g) Record the O2 T90 response time.

#### 4. Check Combustibles T90 Response

- a) Close the aspirator air supply valve.

- b) Close the valve on the aspirator atmospheric vent. This will ensure cal gas will flood the transport tubing and probe.

- c) Open the Combustible Span gas valve, set the calibration flow to 3 SCFH and allow the value to stabilize near 1600 ppm, within 500 ppm.

- d) Close the combustible span gas valve.

- e) Open valve on aspirator atmospheric vent.

- f) Start the timer as the aspirator air supply valve is opened.

- g) Measure the response time for the combustible reading to fall from 1600 ppm to within 500 ppm of process gas combustible value. Note – process may be unstable and test may have to be ran more than once if test fails.

\_\_\_\_\_ h) Record the combustible T90 response time.

- i) If necessary run the test two times record each test.

\_\_\_\_\_ j) Record the combustible T90 response time.

5. Adjust aspirator if necessary to achieve a response time of less than 45 seconds and repeat response time check if adjustment was required.

Caution: A bad sensor or plugged component like a flame arrestor can also cause a slow response time. Replace parts if needed.

Normal air pressure for the aspirator is set at a maximum of ~ 3 psig for close coupled extractive systems and a maximum of ~ 9 psig for extractive to grade systems with an external aspirator.

#### 6. Pass/Fail Criteria for Analyzer Response Time Test.

Mark "Pass" if:

- O2 T90 response is less than 45 seconds.
- Combustibles T90 response is less than 45 seconds.

Mark "Pass and Adjusted" if both O2 and Combustibles T90 response is less than 45 seconds after adjustment and/or replacing parts and rerunning the T90 response time test.

Mark “Failed” if adjustments and/or repairs do not mitigate the issue.

Verify the following:

## **2.0 ANALYZER INSPECTION**

### **1. Verify the following:**

Visual inspection - Analyzer controller, analyzer sensor unit, and sample system components are not damaged. Visual inspection will provide verification that the analyzer is installed correctly and being maintained correctly (including some hidden failures mitigation).

Verify there are no alarms on the controller

For WDG IV only – Verify Two cartridge heaters for sensor box temperature are working. LED DS2 on the sensor board should be solid green. If the LED is not solid green, it should be noted as a deficiency.

- Blinking Green: Under temperature.
- Solid Green: At set point temperature.
- Flashing Green & red: Over temperature.
- Flashing Red: Switch setup invalid
- Solid Red: RTD error (open or shorted)

- Yellow: Indeterminate error

For WDG IV only – Briefly open the sensor box and check the box temperature using an infrared thermometer. WDG-IVc standard temperature is about 445 degrees F. A temperature outside of 400 – 500 degrees F should be noted as a deficiency.

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Notes:

For WDG IV wait at least five (5) minutes after closing sensor unit enclosure before beginning the calibration.

Refer to Manufacture's Troubleshooting guide for resolving problems such as a bad RTD.  
Replace heater as necessary.

For WDG V the box temperature and heater operation can be viewed from HMI. Unlike the WDG IV the WDG V will generate an alarm on the HMI if box temperature is out of limits.

Sample supply tubing is heated above 220 degrees F. Check with an infrared thermometer or other equivalent method such as confirming value on the electronic heat trace controller.

Note - This only applies to fully extractive installations in which the sensor unit is not directly mounted to a nozzle on the furnace.

Sample nozzle is protected from ambient conditions with an insulated cover. If the sample nozzle is heated, confirm temperature using an infrared thermometer or other equivalent method such as confirming value on the electronic heat trace controller.

Tubing insulation is adequate and supply tubing is not exposed to rain or ambient conditions.

Note - This only applies to fully extractive installations in which the sensor unit is not directly mounted to a nozzle on the furnace.

Verify the sample supply tubing is directly connected between the probe and the analyzer. Verify no other sample or utility line is connected to the sample line.

Note - This only applies to fully extractive installations in which the sensor unit is not directly mounted to a nozzle on the furnace.

2. Generate a notification in GEMS/GRT for repair or replacement if deficiencies exist.
3. Proceed with testing if the analyzer is still functional.

#### **9. Analyzer Validation and Analyzer Calibration Check**

1. Verify calibration cylinders for:
  - Adequate cylinder pressure
  - Cylinder valve is open
  - Cylinder regulator is adjusted at 15 PSIG minimum
2. Verify calibration gas values are properly set on controller.
3. Close the aspirator air valve for the sample aspirator.
4. Start calibration routine on the analyzer controller unit.
5. When prompted, OPEN O2 span gas (IAS) valve to flow gas through the analyzer.
6. Adjust gas rotameter to 3 SCFH. Note – pressure and flow must be constant during calibration and validation.
7. Wait a minimum of ten minutes. Record as found span O2 value.  
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Note – During O2 span the combustibles is undergoing a zero check. For WDG IV only, an extended time delay is to de-coke the combustibles hotwire sensor.

8. Accept the new calibration.
  9. When prompted, close the O2 span gas valve and open the zero gas valve to flow zero gas through the analyzer.
- Note – calibration gas rotameter needs to be set at 3 SCFH. Pressure and flow must be constant during calibration or validation.

This gas is used to check calibrate the O2 low and Combustibles zero

10. Wait a minimum of five minutes.
11. Record as found zero O2 and Combustibles values.

O2 \_\_\_\_\_

Combustibles \_\_\_\_\_

12. Accept the new calibration.

13. When prompted, close the zero O2 gas valve.

14. Open the combustibles span gas valve to flow gas through the analyzer.

Note - calibration gas rotameter needs to be set at 3 SCFH. Pressure and flow must be constant during calibration or validation.

15. Wait a minimum of five minutes.

16. Record as found span combustibles value \_\_\_\_\_

17. Accept the new calibration.

18. Close the combustibles span gas valve and open the aspirator supply valve for the sample aspirator.

19. Return to process – shut off zero and span gases at the cylinders.

20. Record O2 and combustibles as left values

O2 span \_\_\_\_\_

O2 zero \_\_\_\_\_

Combustibles zero \_\_\_\_\_

Combustibles span \_\_\_\_\_

21. Ensure all calibration gases are blocked in and air to the sample aspirator is opened.

22. Verify all test are marked as “Passed” or “Passed Adjusted”

23. Mitigate all failed test before removing Control of Defeat.

24. Verify analyzer readings in the field vs DCS are correct.

25. Return analyzer to service, close out Control of Defeat.

**Report test results into GRT by entering all required info into the Managed Reading section.**



**Inform Mechanical Maintenance Supervisor of any unresolved problems.**

**END OF PROCEDURE**