

# Conducting a Laboratory Environment Test (LET) During Commissioning



SOP - Conducting a LET During Commissioning

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# Conducting a Laboratory Environment Test

## 1. Purpose

The purpose of this standard operating procedure (SOP) is to provide the steps necessary to perform Laboratory Environment Tests (LETs). These tests are used to evaluate the control of supply and exhaust airflow, ventilated device exhaust airflow, room differential pressure and room temperature over a range of conditions in the lab spaces. This information combined with BAS snapshots help to determine if the lab-level supply and exhaust components are performing as expected.

## Scope

This SOP describes the procedures necessary to conduct a Laboratory Environment Test (LET), as part of building and laboratory commissioning evaluation. Some of the techniques can be applied to annual routine tests.

## Equipment

- Shortridge™ ADM Series Multimeter (NIST Calibrated) (or other airflow meter)
- Shortridge™ Velgrid and Tubing (or other velocity grid)
- Flow Hood
- Laptop Computer with necessary installed software for recording test data
- Microsoft Excel (or similar spreadsheet software)
- Ladder (sized appropriately for accessing measurement locations)
- Safety Glasses
- Safety Gloves

## Personnel Qualifications

Procedures are to be performed by an experienced and competent technician. Before any tests are conducted personnel must ensure that proper Personal Protective Equipment (PPE) is worn.

## 2. Preliminary LET Procedures

Typically 100% of the laboratories should be chosen to perform the LETs during commissioning. Notify building personnel of test schedule including date, time and location. Personnel should include building management, lab users, maintenance and security. Notification should be given at least two weeks in advance of the LET and on the last business day prior to testing. Ensure that testing does not interfere with operations being conducted within laboratory ventilation devices; including fume hoods, bio-safety cabinets, ventilated enclosures, etc.

A BAS technician will need to be at the BAS to collect snap shots of the labs simultaneously as the LETs are being performed in order to compare the actual values to the indicated values displayed on the BAS.

### 3. Test Procedures

1. Labs with Fume Hoods and/or Bench and Snorkel Exhausts
  - a. Put all devices at maximum exhaust flow
  - b. Lab BAS Snapshot
  - c. Measure Supply and General Exhaust airflows
  - d. Record results on appropriate forms
  - e. Test Fume Hood per SOP
  - f. Test Bench and Snorkel Exhausts per SOP
  - g. Compare to Criteria and Judge Operation
  - h. Measure Room DP & Compare to Room DP Sensor
    - i. within 5% - acceptable
    - ii. >5% - calibrate DPM
  - i. Calculate and compare Offset volume to previous CX results
  - j. If significantly different, measure and adjust supply and general exhaust airflows
  - k. Return all devices to minimum exhaust flow
  - l. Lab BAS Snapshot
  - m. Measure Supply and General Exhaust airflows
  - n. Measure room DP
  - o. Calculate and compare Offset volume to previous CX Results
  - p. If Offset volume is greater than  $\pm 10\%$  of design offset volume, adjust supply and general exhaust airflows
  - q. Re-measure supply and general exhaust airflow to confirm proper offset volume.
  - r. Repeat p and q until offset meets criteria
  
2. LETs/General Exhaust Only Labs
  - a. Measure Room DP & Compare to Room DP Sensor
    - i. within 5% - acceptable
    - ii. >5% - calibrate DPM
  - b. Measure Supply and General Exhaust airflows
  - c. Record results on appropriate forms
  - d. Calculate and compare Offset volume to previous CX Results
  - e. If Offset volume is greater than  $\pm 10\%$  of design offset volume, adjust supply and general exhaust airflows
  - f. Re-measure supply and general exhaust airflow to confirm proper offset volume.
  - g. Repeat e and f until offset meets criteria

## Conducting a Laboratory Environment Test

### 4. Post LET Procedures

Once the data has been collected, it must analyzed, reviewed, and compared to BAS snapshots to identify any variances between measured values and displayed values. The figure below is a sample report that can be used.

Room #	Box #	Measured		BAS Indicated		Flow Error		Box #	Exhaust Type	Measured		BAS Indicated		Flow Error	
		Max.	Min.	Max.	Min.	Max.	Min.			Max.	Min.	Max.	Min.		
118	118-sv01	1118	307	1072	286	-4.3%	-7.3%	118-ev01	FH	346	132	338	127	-2.4%	-3.9%
								118-ec01	bench	184	0	192	0	4.2%	0.0%
								118-ev02	GX	294	299	302	290	2.6%	-3.1%
								118-ec02	arm	456	0	458	0	0.4%	0.0%
arm															
Total				1072	286					1280	431	1290	417		

To complete the form, use the data from the airflow measurements and BAS screenshots. Box flow errors should typically be less than 10%. However, if the BAS Indicated flow is less than 100 ft<sup>3</sup>/min. or cfm (~50 lps), the measured value may create excessive flow errors. In that case, a tolerance of ± 40 cfm (±~20 lps) may be applied to the BAS Indicated flow.

Measurements that generate errors greater than +/- 10% (or greater than 40 cfm (20 lps) for low flow boxes) shall be investigated, remediated, and re-tested. Any actions taken shall be recorded as part of the Management of Change process.

## APPENDIX A - Laboratory Environment Test Measurements Sample Forms

Date: \_\_\_\_\_

Project: \_\_\_\_\_

Building: \_\_\_\_\_

Room: _____				Differential Pressure (in. w.g. or Pa)	NOTES	
Supply #1 (cfm or lps)	Corrected: _____ Uncorrected: _____ Discharge Temp: _____	GEX #1 (cfm or lps)		Occupied Mode: <hr style="border: 0.5px solid black;"/>		
Supply #2 (cfm or lps)	Corrected: _____ Uncorrected: _____ Discharge Temp: _____	GEX #2 (cfm or lps)				
Supply #3 (cfm or lps)	Corrected: _____ Uncorrected: _____ Discharge Temp: _____	GEX #3 (cfm or lps)				
Supply #4 (cfm or lps)	Corrected: _____ Uncorrected: _____ Discharge Temp: _____	GEX #4 (cfm or lps)				Unoccupied Mode: <hr style="border: 0.5px solid black;"/>
Supply #5 (cfm or lps)	Corrected: _____ Uncorrected: _____ Discharge Temp: _____	GEX #5 (cfm or lps)				
Supply #6 (cfm or lps)	Corrected: _____ Uncorrected: _____ Discharge Temp: _____	GEX #6 (cfm or lps)				
Room Temp (°F or °C)		Ventilated Device #1 (cfm or lps)				
Room R.H %		Ventilated Device #2 (cfm or lps)				
		Ventilated Device #3 (cfm or lps)				
		Ventilated Device #4 (cfm or lps)				
<b>Totals</b>						

\*If supply reading is  $\leq 300$  fpm ( $\sim 1.5$  m/s) take one reading; if  $> 300$  fpm ( $\sim 1.5$  m/s) take corrected and uncorrected measurements.

\*Occupied is with all sashes at operating height (Usually 18" (457 mm)).

\*Unoccupied is with all sashes closed.

