


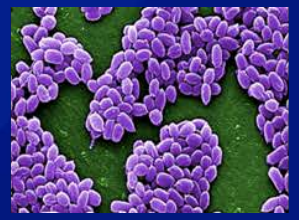

Federal Select Agent Program (FSAP)

Laboratory Facilities Engineering Overview
Federal Select Agent Program

RO/ARO Training Workshop

August 15, 2018

Laboratory Facilities Engineering Overview

How can a TAB used in facility verification help satisfy regulatory requirements?

TAB?

TAB = Test and Balance

- Ensure airflow, velocity and static pressure
- Verify differential pressure
- Maximize occupant comfort
- Efficiency

TAB in the Commissioning Process

VS.

TAB in the Verification Process

TAB and Commissioning

Commissioning (Cx): process of ensuring the HVAC system performs as designed for new construction or renovation.

Who is involved?

- Architect/engineering firms (A/E)
- Cx agent
- Mechanical contractor
- Controls contractor
- Building facilities plays a secondary role at this stage

Why is TAB important to this process?

TAB and Verification

Verification: Testing and confirmation that the HVAC system performs to maintain containment during operational and failure scenarios

- Not to be confused with validation which is evaluation that HVAC system meets the needs of the entity

Who is involved?

- Building facilities staff are primary
- TAB contractors
- Controls contractors
- Mechanical contractors
- In-house or outsourced evaluation firm

TAB and Verification

What is needed for verification?

- Mechanical drawings
- Original Cx and/or design drawings: provides airflow values (cfm), differential pressures (DP), sequence of operations
- Scope of work: what the customer requests from the TAB contractor
- TAB reports are useful if the facility provides them the appropriate historical documentation: *They are not engineers or design contractors.*

Why is TAB Important to this Process?

- TAB should be performed PRIOR TO verification to ensure system performance is consistent with design values
- Non-intrusive, allows analysis of dampers, valves, and airflows needing adjustment and repairs
- Verification testing involves intrusive testing in evaluating system performance during failures
- Report will document ‘before’ and ‘after’ values

Question

If the differential pressure monitors at your doorways are currently reflecting -0.05 inWC, should adjustments be made?

Answer

It depends

We shouldn't hyper-focus on -0.05. Other factors that affect responses to failures include:

- **Air changes – typically, facilities will increase supply and/or exhaust values to achieve -.05. When air velocity increases, dampers & valves require more time and effort to react**
- **We should be evaluating operational conditions, not DP with just doors closed**

Why is TAB important?

- Evaluates HVAC system to gather a checklist of maintenance items
- Verification of measuring devices: building management system (BMS), differential pressure monitors
- Evaluate air changes
- Identifies any system changes from original design and Cx
- Failure scenarios: discuss fans, ACH, N+1, in parallel, and system reaction to failures

How Often?

TAB should be performed annually

- **Identifies degrading performance due to wear on mechanical parts**
- **Evaluates existing conditions for potential failures**
  - E.g., leaks in ductwork
- **Economical**
- **Not intrusive**
- **Can increase efficiency and energy savings**

Means and Methods for Taking Measurements

Flow hoods: provide ‘real-time’ and actual airflow volumes from duct registers

Traverse reading airflows through ductwork

Information from BMS and mechanical drawings

Scenario #1

Replacing hard ducted Class II B2 BSC with recirculating Class II A2 BSC:

- **Impact on system and room: engineering analysis and new TAB**
- **Exhaust for the B2 was calculated as part of room exhaust and air changes**
- **Many facilities utilize separate fans for primary containment exhaust**
- **New A2 is susceptible to airflow turbulence and requires clearances for proper use and placement**
  - May not be able to replace in the same spot as the B2

TEST AND BALANCE

TAB should evaluate primary containment exhaust airflows as part of their analysis:

- **This includes - ducted biosafety cabinets, ventilated racks, isolators, fume hoods**
- **Often, this equipment is served by additional fan(s) that should be evaluated along with the suite**

Scenario #2

- **Architectural changes to a laboratory suite: engineering, design and controls to pass Cx are unique to the original floorplan**
  - Any time space, walls, doors, and/or entry/exit points are modified, it affects how mechanical systems react to environmental conditions and failures to ensure containment
  - Consult with an architect/engineer prior

Scenario #3
The Select Agent Dilemma

Multi-room laboratory suite, however only one room in the suite is registered with FSAP:

Why unregistered areas should be evaluated

- **Original designs include a full suite of labs, corridors, and anterooms that have airflow values that a TAB uses to verify performance**
- **Unless mechanical changes are made, these spaces share common ductwork, controls, and need to function as commissioned to ensure SA-registered space maintains containment at all times**

Evaluating TAB Report

Evaluate data to ensure compliance, but not to tell entity how to design HVAC system

UNIT #	DESIGN AIRFLOW, cfm	DESIGN CAPACITY, tons	TEST AIRFLOW, cfm	TEST CAPACITY, tons
AHU-1	15,525	60.8	13,528	53.0
AHU-2	12,220	47.8	12,098	47.3
AHU-3	12,370	48.4	11,282	44.1
AHU-4	15,200	59.6	13,293	52.1
AHU-5	14,725	57.7	12,199	47.8
AHU-6	19,900	78.5	16,356	64.5
AHU-7	20,100	79.3	16,111	63.6
AHU-8	23,825	93.7	20,086	79.0
AHU-9	22,725	89.5	17,832	70.2
AHU-10	19,525	76.7	15,335	60.2
AHU-11	10,000	38.9	10,003	38.9
AHU-12	15,500	51.9	13,585	45.5
TOTAL	201,615	782.8	171,698	666.2

How can a TAB can help satisfy regulatory requirements?

- **Identify deviations in system performance that could lead airflow reversals in failure scenarios**
  - Airflow reversal may result in APHIS/CDC Form 3
- **Identify HVAC components that may need maintenance or repair to prevent a failure**
  - Some maintenance or repair items may require repeat failure testing (BSL-3/ABSL-3 Verification Policy Statement is posted on the FSAP website at: https://www.selectagents.gov/regBSL3ABSL3policy.html)
- **Means of detecting airflow has been confirmed to accurately reflect observed airflow (BSL-3/ABSL-3 Verification Policy Statement)**

Discussion

www.selectagents.gov

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301-851-3300 option 3 (voice only)