

ACG 7th Annual Conference on Total Building Commissioning

COMMISSIONING ACTIVE BEAMS



Presented By

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Agenda

Introduction to Active (Chilled) Beams

- De-coupled ventilation systems
- Principles of operation
- Fan energy savings
- Active beam benefits
- Suitable areas for active beams
- Psychrometrics
- Condensation risks
- Placement within the ceiling

Installation

- Placement within RCP
- T-Bar / Drywall / Exposed
- Template for installation
- Threaded rod vs. aircraft cable
- Seismic Restraint
- Exposed units
- Unit cleanliness prior to start-up
- Shop drawings and schedules as a tool for commissioning

Agenda

Air-Side Control





- Temperature control and reset
- Compliance with ASHRAE Std. 55
- Placement within ceiling
- Constant volume vs. VAV
- Acoustics
- Balancing and confirmation
- Challenges (Duct size vs. ΔP for given flow)

Water-Side Control

- Free cooling options
- Piping configuration
- Temperature control and reset
- Pressure dependent vs. independent
- Manual circuit balancing

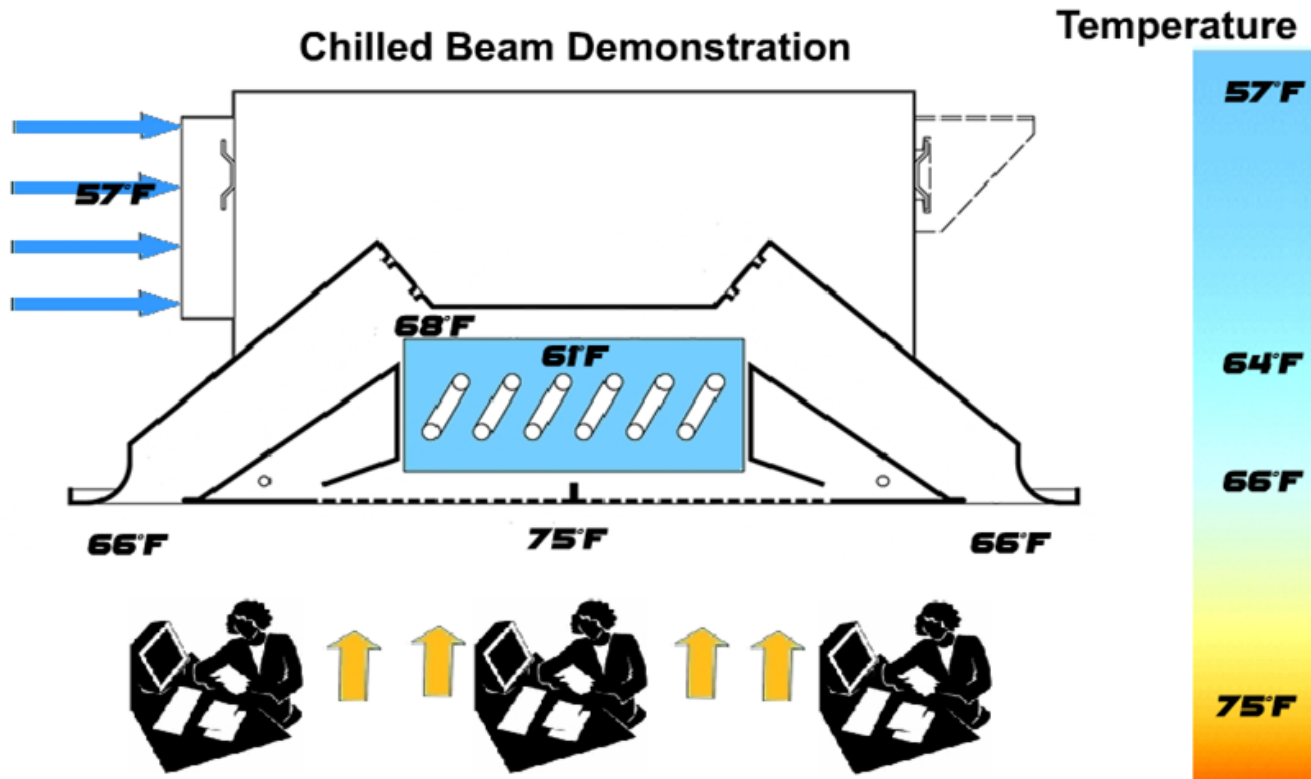
Introduction to Active Beams

De-coupled Ventilation Systems

		Energy Usage	Noise Level	Output	Comments
	Fan Coil Units	Medium/High	Medium	100-200 w/m ² 32-64 Btuh/ft ²	Adaptable solution
	VAV Systems	Low	Low/Medium	100-200 w/m ² 32-64 Btuh/ft ²	Very efficient all-air system
	VRV System (Variable Refrigerant Volume)	High	Medium	150-200 w/m ² 48-64 Btuh/ft ²	Potential for high maintenance costs
	Active Beams	Low	Medium	100-394 w/m ² 32-125 Btuh/ft ²	Extremely low maintenance costs

Introduction to Active Beams

Principles of Operation



Introduction to Active Beams

Fan Energy Savings

Introduction to Active Beams

Suitable Areas for Active Beams

Yes/Maybe

Spaces with moderate latent loads
High sensible loads
Office spaces
Schools
Desktop farms
Labs – Check Psychrometrics and codes

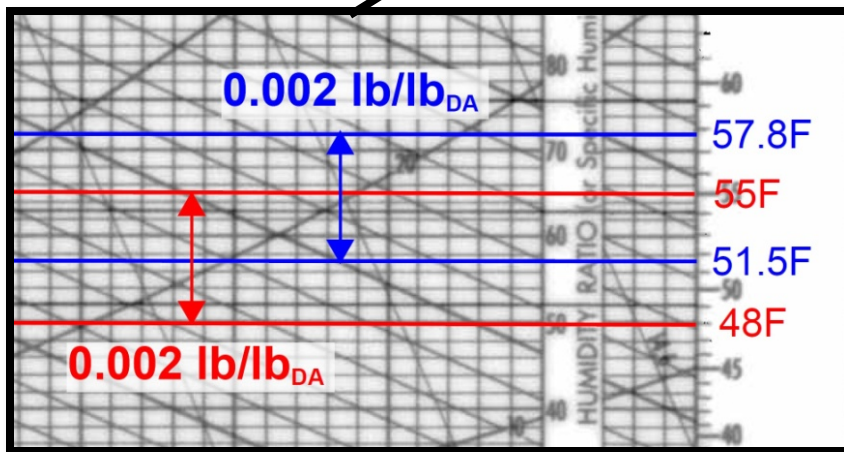
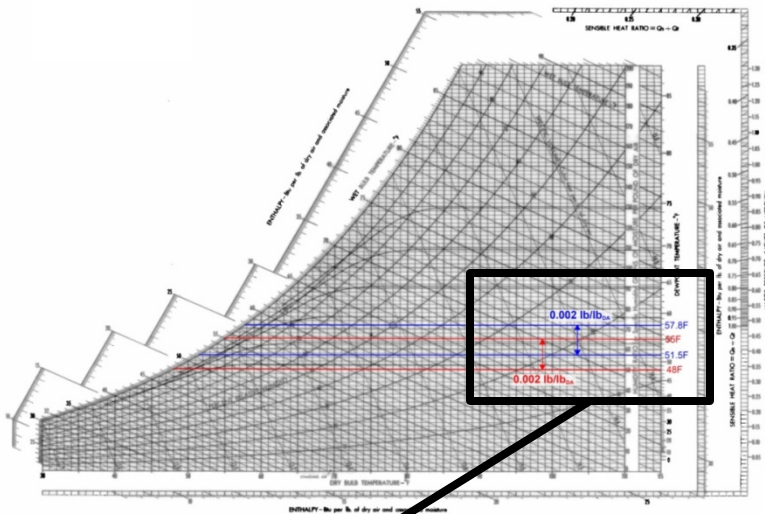
No

Kitchens
Atriums
Zones with high latent loads
Locker rooms
Pool areas
Entry vestibules
Computer rack rooms
Areas with high ceilings (i.e. >14')?

Patient Recovery Rooms (YES?)

Introduction to Active Beams

Psychometrics



	Option 1	Option 2
Primary air dew point	48°F	51.5°F
Room air dew point	55°F	57.8°F
Secondary CWT	55°F	58°F
Dehumidification	0.002 lbs/lb _{DA}	0.002 lbs/lb _{DA}

RESET FOR ENERGY SAVINGS!

Introduction to Active Beams

Condensation Risks

Areas of greatest condensation risk:

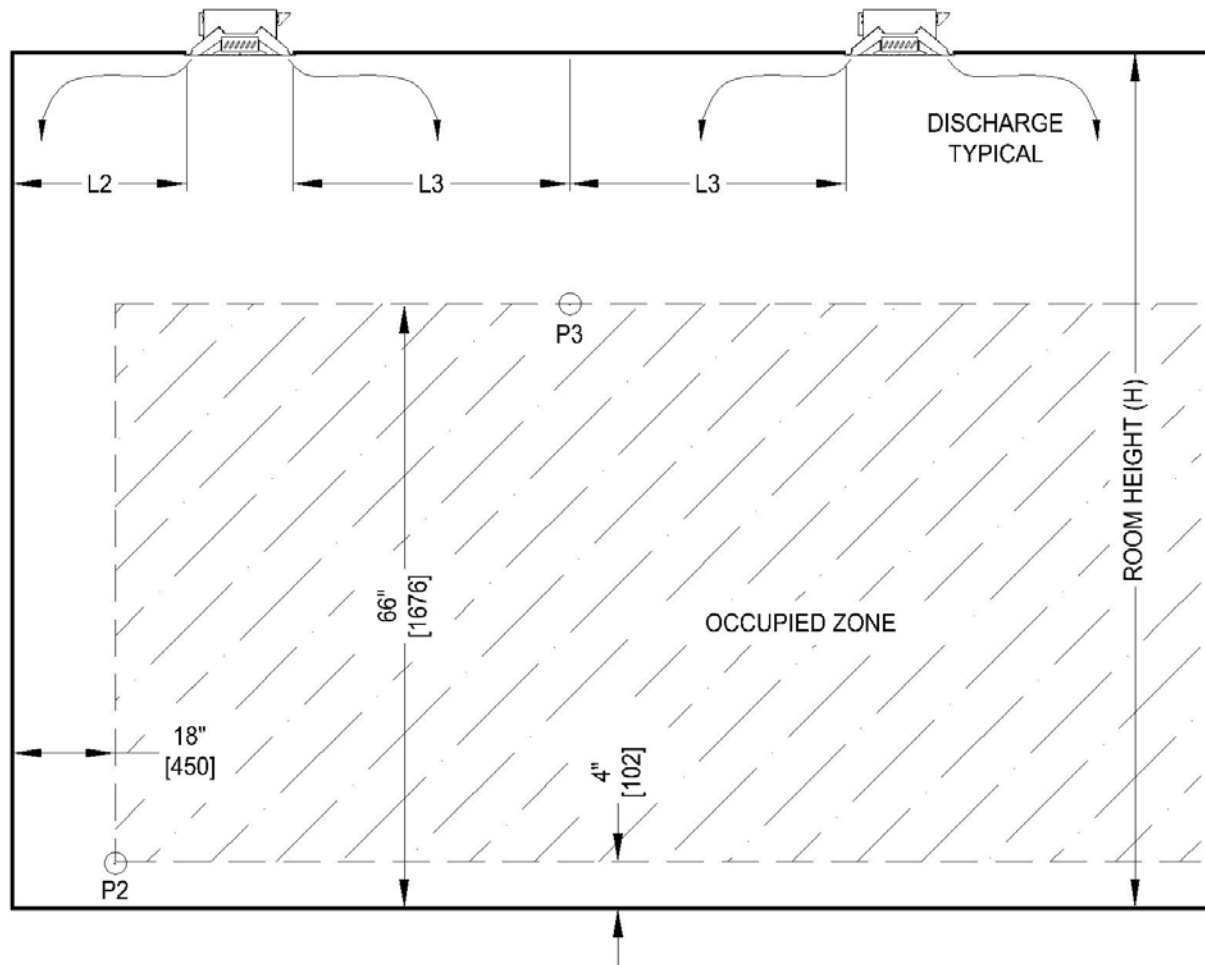
- 1) Near points of entry to the building
- 2) At the perimeter, with mixed-mode ventilation
- 3) Structures with poor building envelopes, including retrofit applications
- 4) In areas with highly variable latent loads:
 - Board rooms
 - Lunch / coffee rooms
 - Etc...

Condensation prevention strategies may include:

- 1) De-activation of secondary chilled water supply, by zone, via loss of dew-point from sensors mounted to CWS lines. (... or via combination: DB / RH zone stats, or other...)
- 2) Tempering secondary chilled water supply by zone via:
 - Three-way mixing valve
 - Injection pumps
 - Etc...

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Placement within the Ceiling



P2 drops rapidly moving into the room

P3 = ½ at 3ft into occupied zone

Introduction to Active Beams

Inherent Comfort with Active Beams

Precautions



Warning:

Do not pull on the bomb-bay doors to open the unit, as damage will occur to the spring latch. To open properly, push the face of each door, at the corner of the door, near each end, until the sound of the spring latch is heard to have dis-engaged the door mounted clasp. Relieve pressure and the door will drop open. To close, push the face of each door at each end, until the spring latches engages.



Warning:

Do not remove protective film/paper within the beam doors prior to commissioning the system. The plastic film or cardboard installed at the inlet of the coil, is used to prevent dust and dirt from accumulating inside the coil, during construction.

Units are not to be used for temporary heating and/or cooling without prior written consent from the consultant.

Primary Air Pressure Testing Port

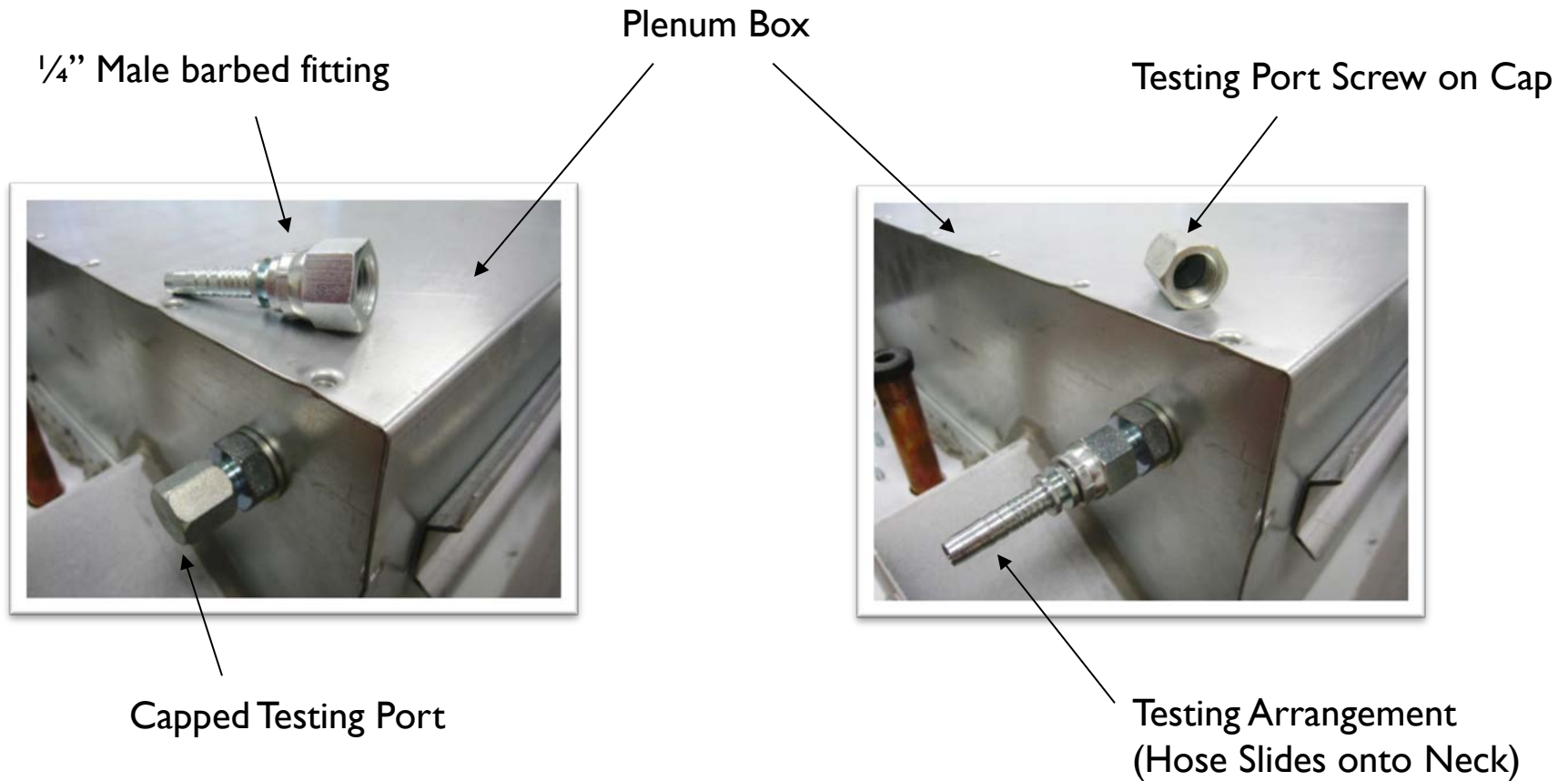


Figure 1: Static Pressure Testing Port Location

Maintenance

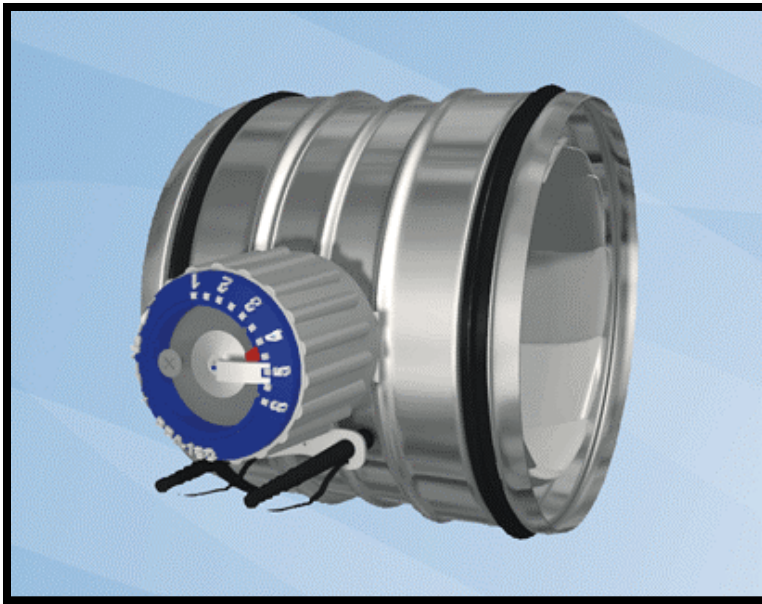
- Beams require very little maintenance. If the coil remains dry, there is very little risk of fin “bridging”.
- Lower, or remove perforated doors in front of unit mounted coil, at 6-Months, and 1-Yr., to establish maintenance schedule. Areas with higher airborne contamination require more frequent cleaning.
- Often, cleaning schedules can extend to between 3-5 years in cleaner environments.
- Higher housekeeping frequency, reduces the intervals between vacuuming the coil(s) with a “horse-hair” bristle brush.

Coil Maintenance

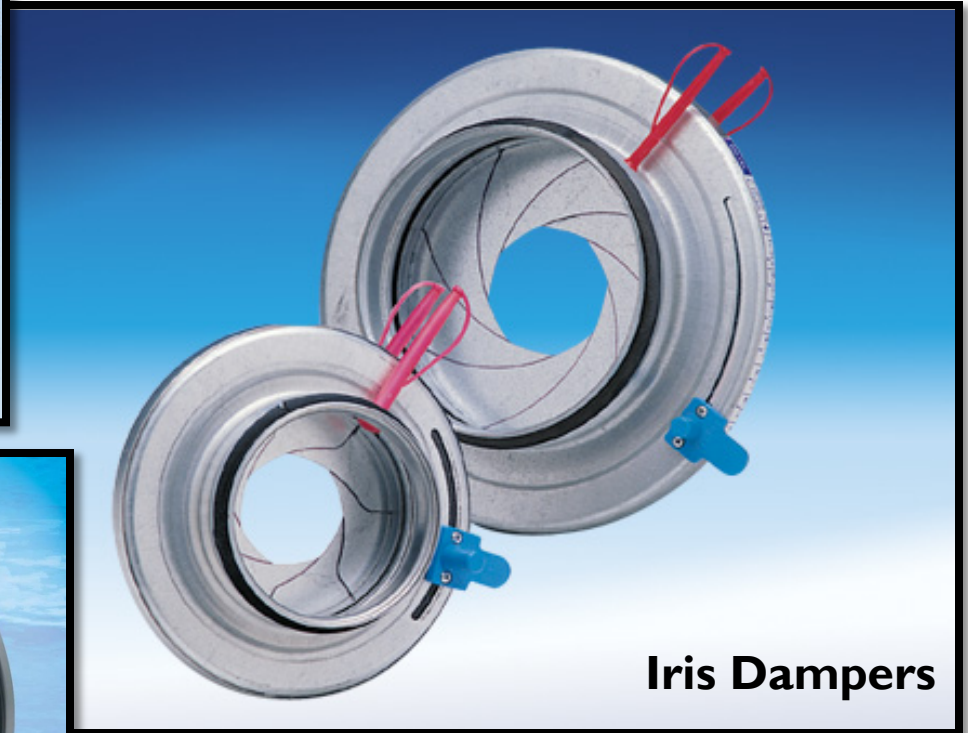
Vacuum with or
without “horse-hair”
bristle brush



Recommended Damper Types



**Iris Dampers –
(angled multi-leaf
blades)**



Iris Dampers



**Pressure independent
– butterfly type**

Water Flow Regulation

- Pressure Independent
- Water Control Valve (Constant Flow Rate)

