Case Studies in Building Commissioning
(If you don’t measure it – Don’t believe it)

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Agenda
Commissioning vs TAB
Air Barriers / Thermal Barriers
Duct Leakage
Example Commissioning Findings

What is Commissioning?

- Making sure the Owner got what they wanted and paid for
- ASHRAE – “The process of ensuring that systems are designed, installed, functionally tested, and capable of being operated and maintained to perform in conformity with the Owner’s design intent.”
- To be most effective, CX needs to start BEFORE the design

Air Barrier Commissioning

- Making sure the Owner got what they wanted and paid for
- ASHRAE – “The process of ensuring that systems are designed, installed, functionally tested, and capable of being operated and maintained to perform in conformity with the Owner’s design intent.”
- To be most effective, CX needs to start BEFORE the design
- Commissioning is NOT punch list and/or Test Adjust & Balance (TAB)
Thermal Barrier Commissioning

- Rim joist air leak
- Kitchen cabinet fur-down
- Insulation level visible
- Insulation in contact with drywall
- No insulation contact with drywall

New Library Humidity Control

- New 8500 sq ft Library
- 35 tons AC (240 sq ft/ton)
- “Hot” complaints
- Tested ~ 8 ACH50
- Return leaks indicated
- “Return Plenum Ceiling”
- ~2600 cfm of OA with intake blocked!!!

New Library – After Initial Corrections

- Improved relative humidity and temperature control, but not good
- High relative humidity most nights
- Temperature still inconsistent

New Library – Next Corrections

- Temperature sensor located high in atrium
- Air conditioner responding to wrong temperature requirement
- High night time relative humidity was due to exhaust fan always on
Senior Assisted Living Center

- ~400,000 sq ft, $56M property
- ‘Others’ had reported duct leak problems
- Referred to us because was in litigation
- Designed for sheet metal ducts
- Built with flex / ductboard
- Initial job was to inspect & report findings

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Senior Assisted Living Center

- Then asked to “talk to attorney” (aka 7 hour deposition)
- Oppositions case was that any duct leaks were contained to individual apartment by fire code so leakage didn’t matter
- Owner authorized duct leak testing on sample units…

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Assisted Living Center Remediation

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Senior Assisted Living Center

Remediation Pictures -
Stages Duct Leakage Testing

- Our duct are so good they don't need to be tested
- Ducts can't be leak tested (ASTM E1554)
- The test is WRONG!
- Duct can't possibly be sealed as specified so the current leakage should be accepted as is
- This wasn’t included in our bid – it will cost extra (Testing MUST be specified)
- See – I told you we would take care of you

Duct Leak Testing Truths

- If the contractor can't show duct leak test experience – that contractor is NOT qualified
- If it can't be sealed as tight as a duct or it can't be tested to be sealed as tight as a duct – the *DESIGN* should NOT show it to be used as a duct (E. G. - plenum ceilings, Under Floor Air Distribution, building cavities, panned joists, etc)
- Duct should be tested at rough-in (for contractor's benefit) and a final (for Owner's benefit)
- Ducts CAN and MUST be sealed – but it requires effort during design, installation and verification

Condo Odor Problem

- Built as apartment in 1971
- Converted to condos in 2006
- 1320 sq feet, ground level, two story
- Odor got bad in 2006, investigation started in 2010
- Odor traced to ‘leaking sewer vent’

Condo Odor

- Sealed HVAC/return plenum as first step
- Upstairs condo owner now interested in corrections
- Smoke test proved leak was in upstairs condo and verified vent stack did NOT penetrate roof
- 2011 Sewer vent thru roof added - problem solved
Archive HVAC

- Poor humidity control
- Dehumidifiers were failing within 1st month of installation
- Repeated failures until dehumidifiers were abandoned & replaced with portable dehumidifiers
- Temperature control considered acceptable

Archive - Emergency Due to Damaged Materials

- Water in regeneration air ducts to be leaking onto collection
- ½” Elastomeric insulation did not keep duct surface temp above OA dew point
- Blocked OA ducts above roof with ductboard

Archive – 6/24/2013

- Electrical compartment full of water again
- Ductboard had failed
Sq Ft per ton Metric

- Why as we build more energy efficient buildings – do they need MORE air conditioning???

OA Conditions for Austin Texas

- Summer Day
  - Approximately twice the hours at dehumidification condition
  - Dew point almost constant
- Annual
  - ~4100 hours above 55 DP
  - ~175 hours above 94 DB

Recommendations