IEQ Commissioning for Sustainable Buildings

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Commissioning is the process that encourages and measures Quality.

… but …

Only those who do the work can create Quality.

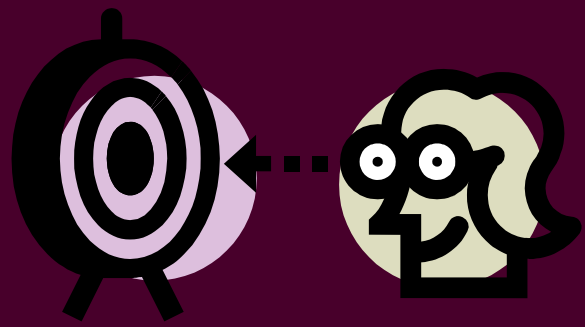
Definition

Commissioning Process:

A quality-focused process for enhancing the delivery of a project (that focuses on) verifying and documenting that the facility and all of its systems and assemblies are planned, designed, installed, tested, operated, and maintained to meet the Owner's Project Requirements.

ASHRAE Guideline 0-2005, The Commissioning Process

Quality Control



- Commissioning is the owner's quality assurance process
- Goal: Improve the quality of facilities
- It is proactive
  - Promote understanding of quality expectations
  - Prevent issues from becoming problems
  - Verify achievement of project requirements

IEQ Goals for Sustainable Buildings

- What is important?
  - Varies by owner
  - Varies by occupancy / use
  - Varies by sustainable rating system

Group Activity

- What is needed for good IEQ in a sustainable building?
  - Write down 3-5 needs
  - Prioritize them
  - Share with group (sound bite)
- Rank responses

Small Group Discussion

- **What must happen to deliver IEQ goals? (specifics for each goal)**
  1.
  2.
  3.
  4.
  5.
- **Share Small Group conclusions**

What about this question?

- Do questions like this help us achieve sustainability?
- When should such questions be asked?
- Are they being asked on your projects?
- Are you invited to participate?

What just happened?

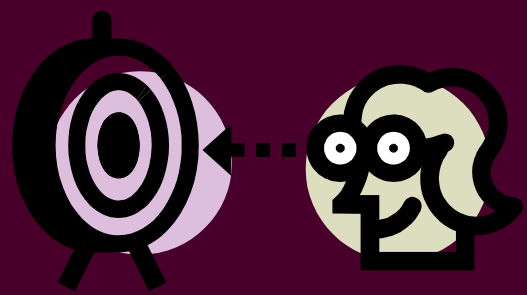
- You have begun the commissioning process
  - Define the Owner's Project Requirements
  - Single most important step in the commissioning process
  - Occurs during pre-design

Change the Process

- **Insanity: Continuing to do the same thing over and over again, and expecting different results.**
- **If we expect a better outcome (sustainable buildings), then we must change the process by which we acquire, manage, operate and maintain our facilities**

Owner’s Project Requirements

- **Predesign:**
  - Define Owner’s Project Requirements (OPR) for IEQ
  - Measurable, achievable criteria
  - Include in architect's scope of work



Performance Criteria

- Based on OPR
- Document in Basis of Design
- Specify performance
- Verify performance of design
- Verify performance of installed systems
- Verify effectiveness of training
- Monitor performance
  - Continuously
  - Periodically

Control & Monitor Moisture

- **Design: Specify contractor controls and acceptance limits**
  - **Maximum acceptable level of moisture in building materials (e.g. concrete, GWB)**
  - **Maximum moisture content & duration**

Control & Monitor Moisture

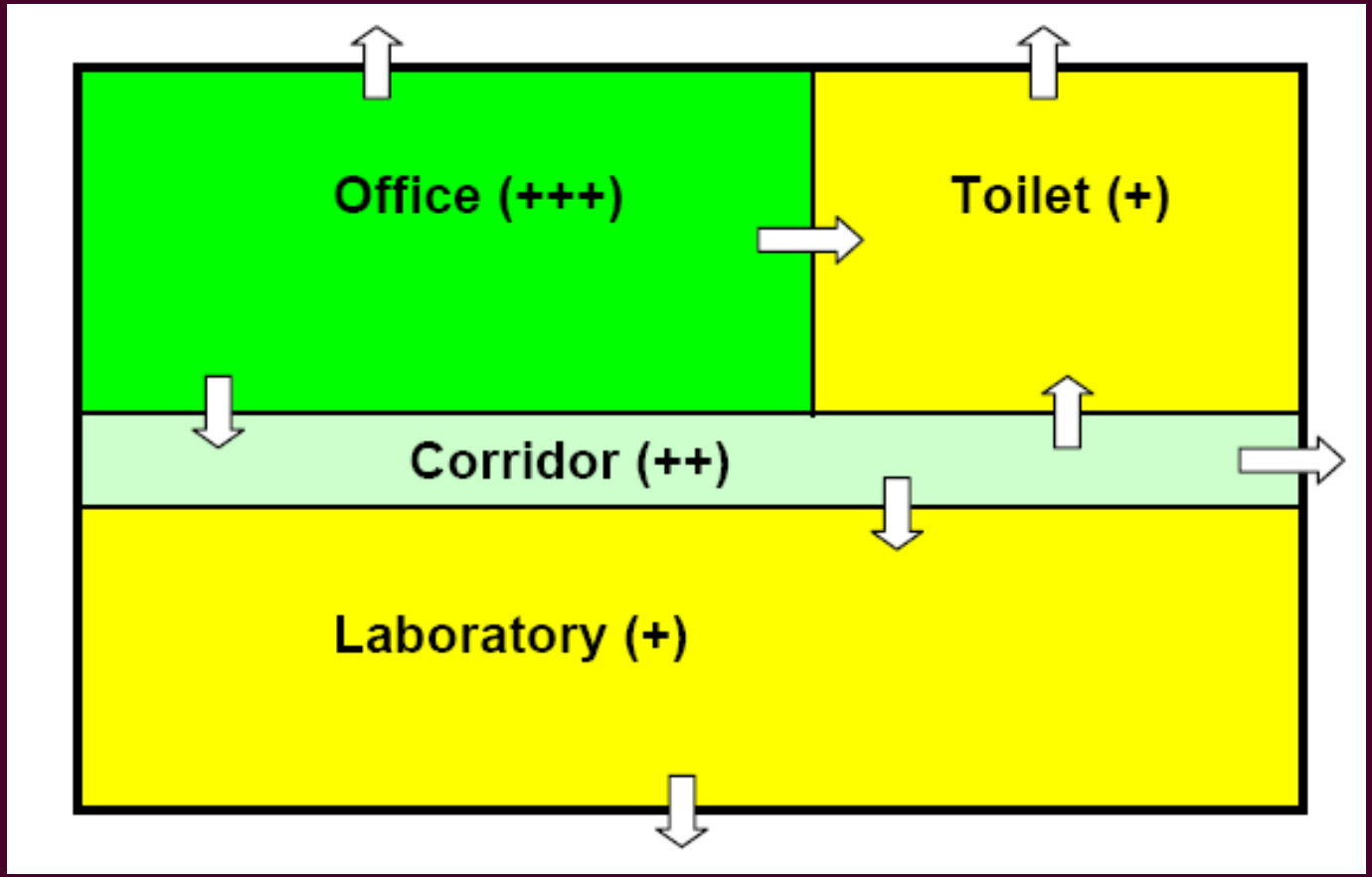
- **Construction: Material moisture content**
  - **Measure moisture**
    - **Before finish applied**
    - **After finish completion**
    - **Map damaged areas for correction**

Moisture meter

Control & Monitor Relative Humidity

- **Construction: Monitor**
  - **Monitor RH after enclosure**
    - **Multiple locations**
  - **Control RH to acceptable levels**
    - **Fans**
    - **Dehumidifiers**

Building Pressurization



Building Pressurization

- **Design:**
  - Air balance
  - Pressurization map
  - HVAC Sequence of control
- **Construction: Verify**
  - Balancing (TAB) verification
    - Report +/- 5% of spec?
    - Field verification of report
      - Include space pressurization

Building Pressurization

- Measure air pressure differential between spaces
  - (wall cavities, plenums, adjacent spaces, etc.)
- What is a web knockout?
  - Space for wiring & piping?
  - Wall ventilation channel?

Envelope Performance

- Building air leakage rate
  - Blower door test

Envelope Performance

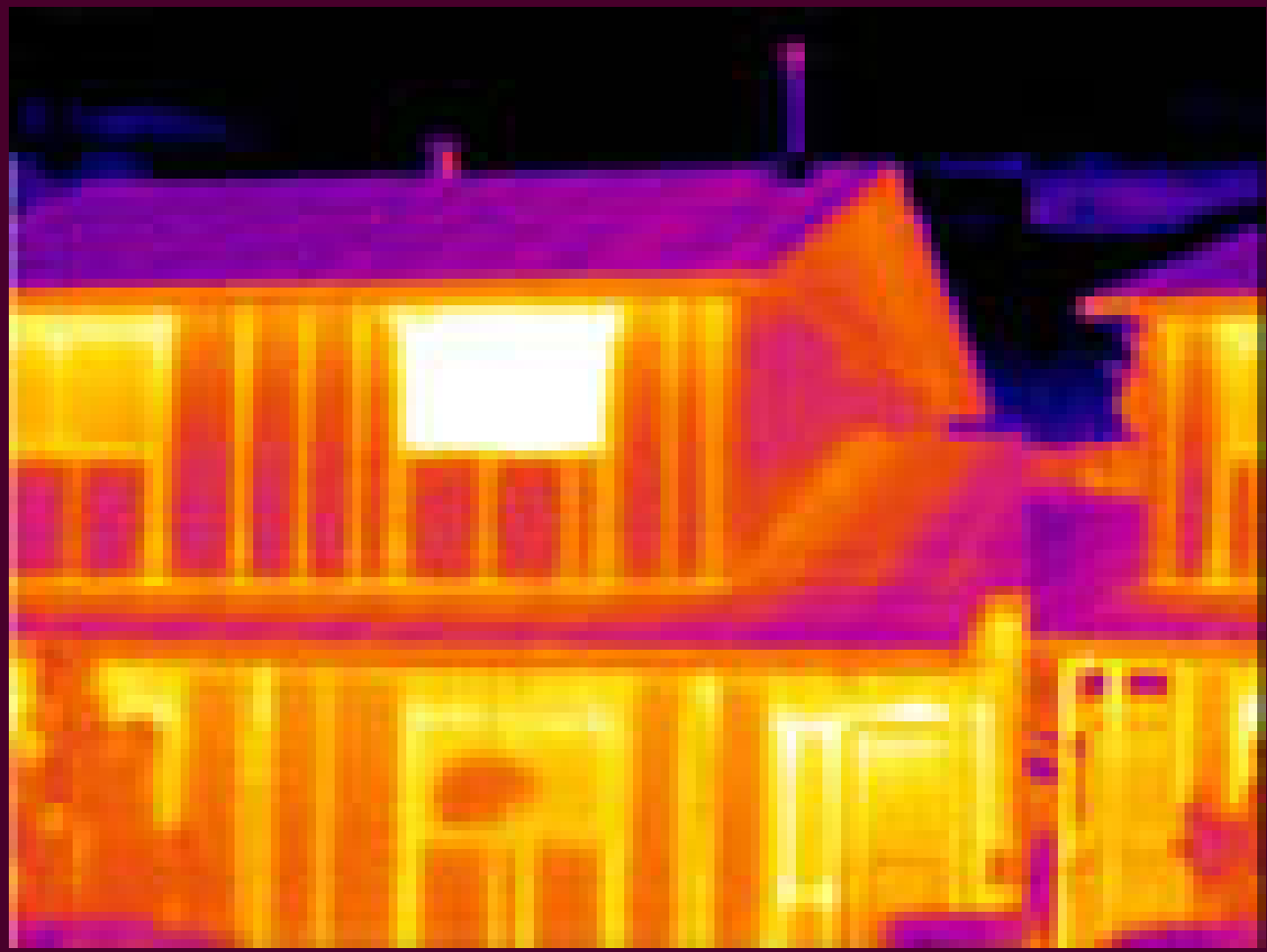
- Roof leak test, including drains
  - Flood to overflow roof drain level for 24 hours
    - Plug roof drains
- Mechanical room floor leak test
  - Flood to cover entire floor
    - Plug floor drains

Flood Test?

Envelope Performance

- Infrared scan of envelope
  - Cold outside air, just before dawn
    - 30°F air temperature difference indoor to outdoor
  - Pressurize and heat interior
    - “See” air leaks

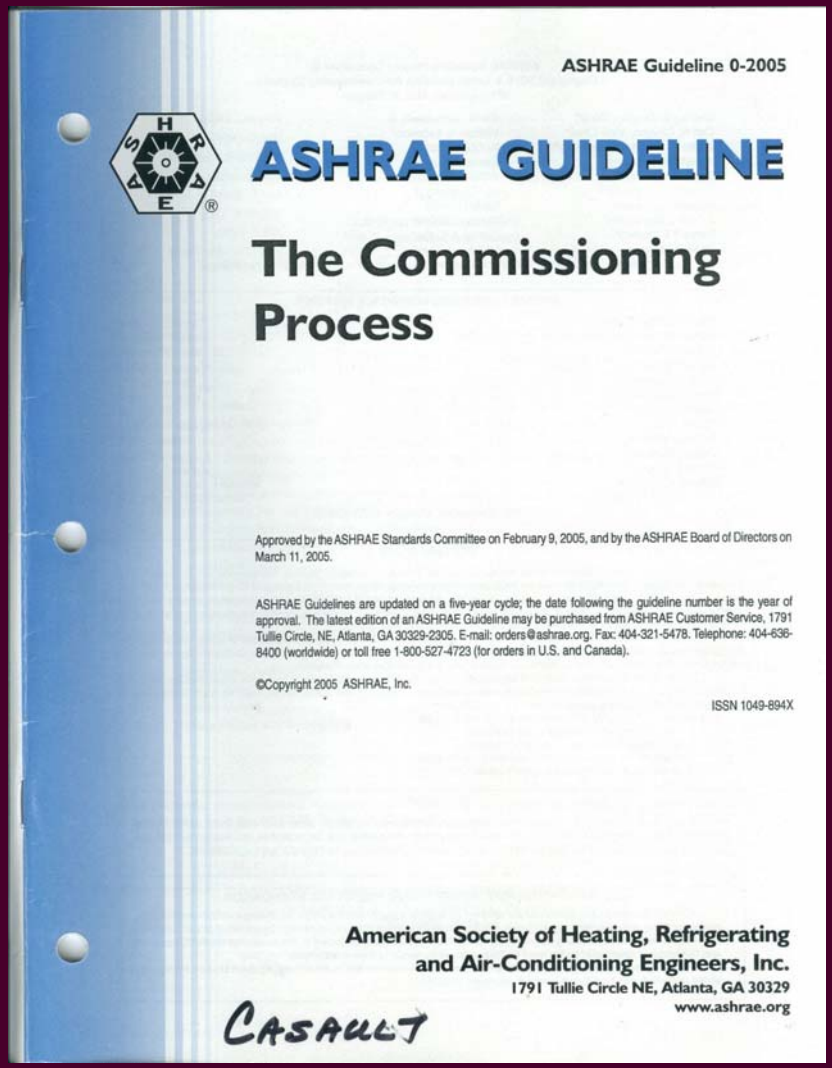
Envelope Infrared Thermograph



HVAC Performance

- Dehumidification capacity test
  - Instantaneous condensation capacity
  - Ability to maintain RH under max design load
- Outside air volume and mixing
  - Minimum OSA volume for all VAV modes
  - Mixing effectiveness in occupied spaces

ASHRAE Guideline 0-2005



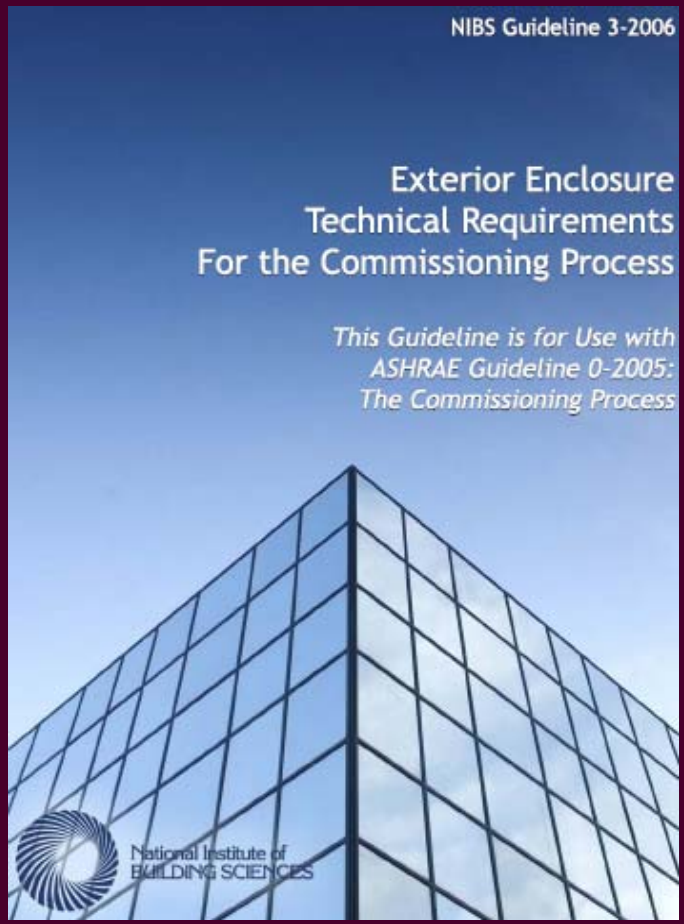
- **Commissioning Process - applicable to all systems**

  http://www.ashrae.org

- **Systems technical cx requirements : "Total Building Commissioning Guideline" being developed under NIBS coordination**

  http://www.nibs.org/#

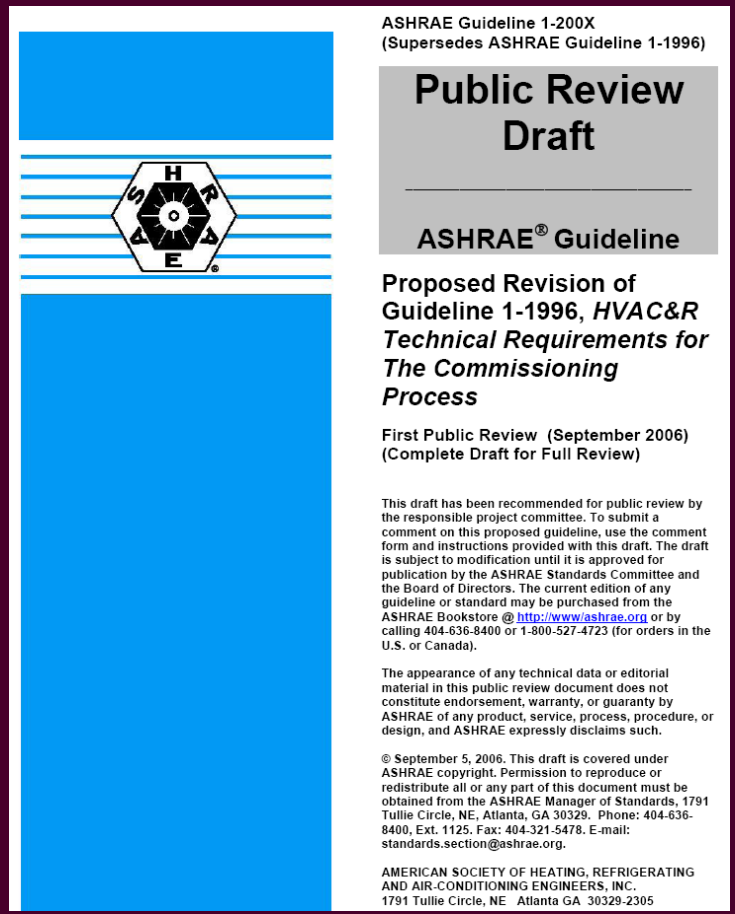
NIBS Guideline 3-2006



- **Exterior Enclosure Technical requirements for Cx Process**
- **Free download:**

  http://www.wbdg.org/ccb/NIBS/nibs_gl3.pdf

ASHRAE Guideline 1-2008



ASHRAE Guideline 1-200X
(Supersedes ASHRAE Guideline 1-1996)

Public Review Draft

ASHRAE® Guideline

Proposed Revision of Guideline 1-1996, *HVAC&R Technical Requirements for The Commissioning Process*

First Public Review (September 2006)
(Complete Draft for Full Review)

This draft has been recommended for public review by the responsible project committee. To submit a comment on this proposed guideline, use the comment form and instructions provided with this draft. The draft is subject to modification until it is approved for publication by the ASHRAE Standards Committee and the Board of Directors. The current edition of any guideline or standard may be purchased from the ASHRAE Bookstore @ http://www/ashrae.org or by calling 404-636-8400 or 1-800-527-4723 (for orders in the U.S. or Canada).

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1791 Tullie Circle, NE Atlanta GA 30329-2305

- **HVAC&R Technical requirements for Cx Process**
- **Approved for publication last week**

ASHRAE Proposed Standard 160

BSR/ASHRAE Standard 160P

Public Review Draft

ASHRAE® Standard

Proposed New Standard 160, *Design Criteria for Moisture Control in Buildings*

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- Being revised for public review
- "… performance-based design criteria for predicting, mitigating or reducing moisture damage to the building envelope, materials, components, systems and furnishings …"

Change the Process

- To achieve sustainable buildings, we must change the process.
- The Commissioning Process, implemented at predesign, is a necessary change in the process of acquiring, managing, operating, and maintaining sustainable buildings.

QUESTIONS?

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Thank You!