

Job of the Building Envelope

Controls heat flow
Controls air flow
Controls water vapor flow
Controls rain penetration
Controls light solar and other radiation
Control noise
Control fire
Provide strength and rigidity
Be durable
Be aesthetically pleasing
Be economical

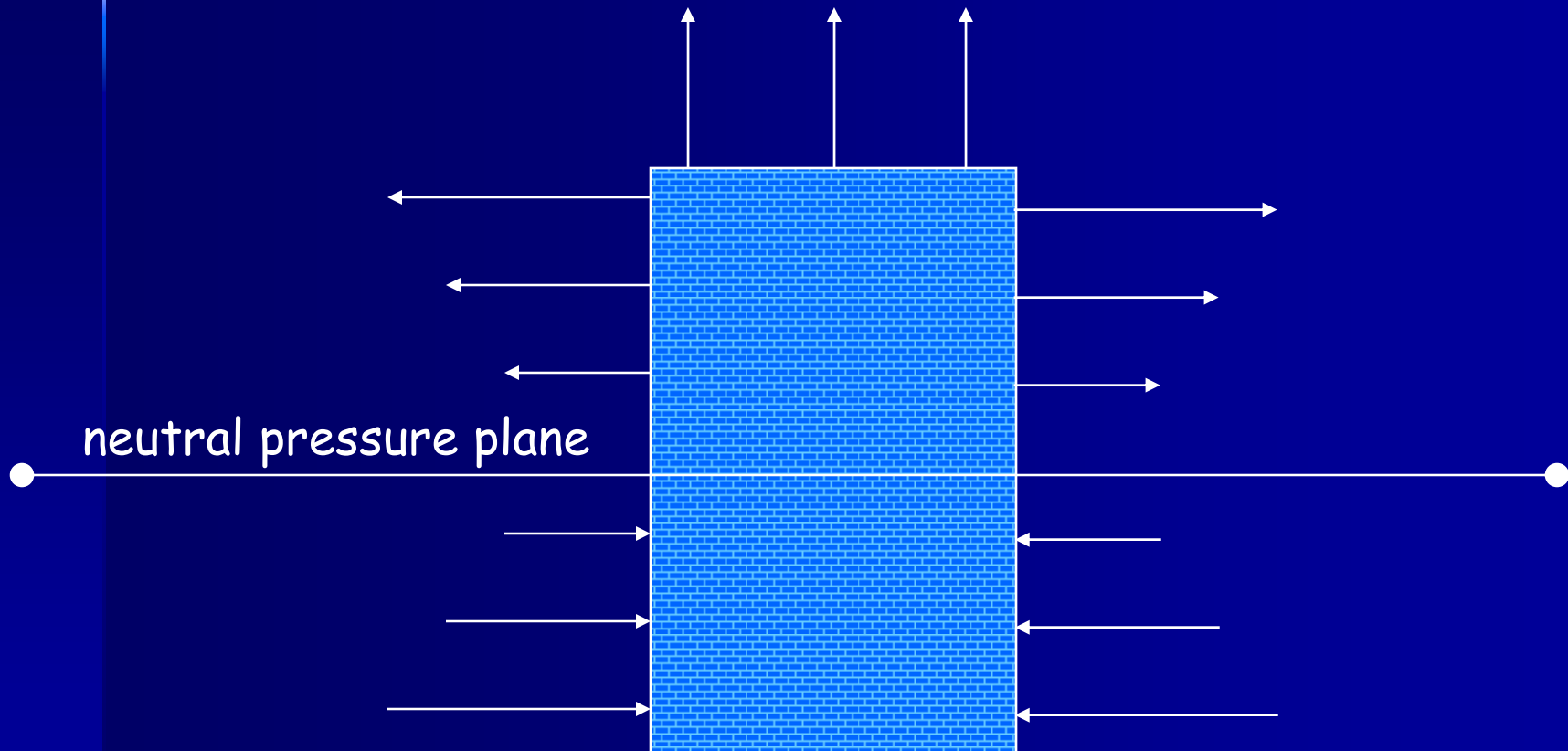
Building Envelope

- The building envelope and the HVAC systems are integral
- If the building envelope isn't doing its job then the HVAC system cannot work properly
- If the HVAC system isn't working properly then the building envelope cannot do its job.

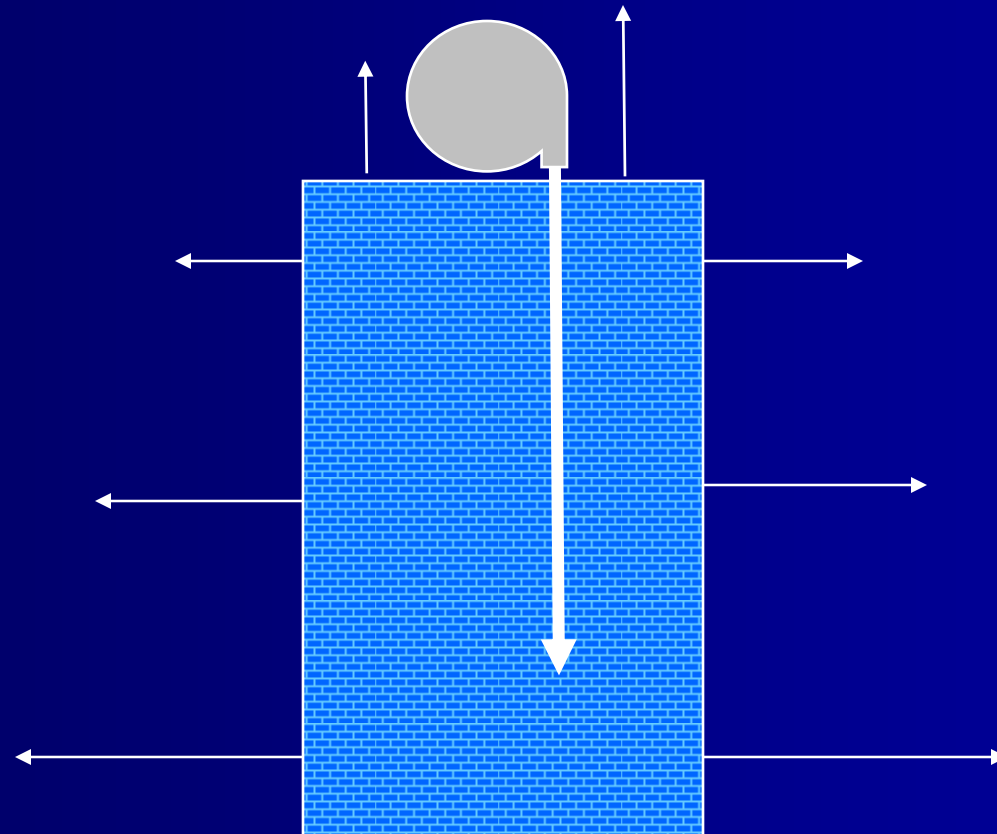
Building Envelope

- Conduct visual inspections
- Look for breeches in the envelope
- Make note of openings in the envelope and the direction of pressurization
- Use infrared thermography
- Find opportunities to tighten the envelope

Stack Effect



Mechanical Pressurization



Envelope Air-tightness Standards

- The focus used to be mostly on window and door infiltration.
- Standards for infiltration through the opaque envelope was changed significantly in ASHRAE 90.1-2010.
- “It’s all in the connections”
- Infiltration and ex-filtration impacts:
 - Unnecessary energy consumption
 - Disrupts HVAC system
 - Condensation → Mold, Decay, Corrosion
 - Causes IAQ problems and contributes to health problems

Site Test Methods

- **QUANTIFIED**
 - **Windows, ASTM E783**
 - **Blower Door, ASTM E779**
 - **Tracer Gas, ASTM E741**
 - **Pressure Test, ASTM E330**

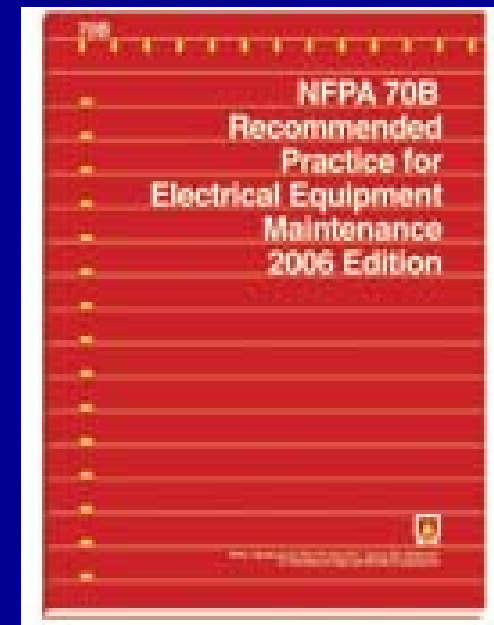
Important Electrical Equipment Standards

NFPA - 70B Recommended practice of electrical equipment maintenance

- Identifies equipment in need of electrical maintenance
- Suggests maintenance procedures
- Suggests maintenance schedule

NFPA – 70E Standard for Electrical Safety in the Workplace

- Includes arc flash safety



Cx of Electrical Systems

- **Levels of commissioning vary with...**
 - type of facility
 - type of electrical system
 - jurisdiction
 - owner's intent
 - budget

Cx of Electrical Systems

- **Minimal Level Commissioning**
 - Lighting - levels and controls
 - Calibrate sub-metering
 - Infrared survey of switchgear, panel boards and large motors under load.

Cx of Electrical Systems

Lighting

- Checking light levels
- Updating automated lighting system schedules
- Confirming photocell lighting control for exterior lights
- Confirming day lighting controls on interior

Plumbing

- Domestic Water- minimize pressure booster pump station energy consumption with VFD
- Implement heat recovery to preheat DHW
- Minimize cooling tower blow down
- Eliminate once through cooling systems
- Water conserving Low Flow fixtures