PH Verification for Large Buildings: What We’ve Learned So Far

Lois B. Arena, PE
Overview

• Focus: Verification of Insulation and Air Barrier Continuity
• Issues that dictate QA/QC program
• Case Studies
  – Cornell
  – Beach Green North
  – 3365 Third Ave
Verification for Large Projects

- Project Sequencing: Foundations
  - Abutting neighbor?
  - Staging of foundation?
  - Under slab
  - Stem walls
Verification for Large Projects

- Inspection above grade & testing process
  - Wall construction
    - Brick & block
    - Panel
    - Metal Stud
  - Staging
    - Drywall starting on lower levels, still insulating at top
    - Opening like hoistways, elevator shafts, HVAC shafts
Verification for Large Projects

• Inspection roof insulation
  – Equipment on roof
    • Curbs
    • Brackets
    • Small dividing walls
  – Bulkheads/unconditioned mechanical rooms – roof insulation needed in these areas before main roof
CORNELL
ROOSEVELT ISLAND, NY
Drill Into Details

Air and vapor barrier must be addressed at this location.

Insulation void in concrete block. Area must be insulated.
Identify Sequencing & Timing of Inspections

PANEL INSPECTION TIME LINE

- Truck arrives to site
- Panel on roof
- Panel on building
- Fire alarm wrapping in progress
- Fire alarm complete
- Fire safety complete
- SWA perform inspection

- Matt and Fabian to do visual inspection of load and fill panel, numbered if accessible
- Matt and Fabian to assess condition of interior of panel, windows, and note on any deficiencies on a floor plan
- Matt and Fabian to assess condition of exterior of panel, windows, and notate any deficiencies on a floor plan
- Matt and Fabian to inspect floor to make sure it is ready for finishing. If deficiencies will be noted on a floor plan and given to EWS to remediate
- Matt and Fabian to do visual progress and compliance inspection
- Matt and Fabian to do visual progress and compliance inflation

- Insulation installed
- SWA inspects insulation
- Steel stud tracks and electrical conduits, etc. installed
- How much time does it take between each stage?

SWA’s Scopes

• Include prelim QA/QC checklist development
  – Dependent on construction type
• Final blower door test plan
Develop Contractor Checklists

PASSIVE HOUSE PANEL WALL INSPECTION CHECKLIST

PANEL SUBSTRATE
A. PANEL
B. Poured Concrete
C. CMU

PANEL WALL INSPECTION

PANEL INSULATION

- Wall panel insulation inserted without gaps?
- Insulation compatible with panel installation?
- Panel insulation dry?
- Insulation installed at panel to panel transition?

NOTES:

CONFIRMATION OF INTESLO SURFACE PREPARATION

- Is surface dry per HWS checklist?
- Is surface even free of voids and sharp protrusions per HWS checklist?
- Is surface free of dust, dirt or other foreign matter per HWS checklist?
- Is substrate concrete has it been allowed to cure?

INTESLO INSTALLATION

- Is printed side facing installed?
- Are insulas free of sage, or cheese?
- Is melamine tray surface adhered with Tegenage 3M?
- Is intello to metal clad surface adhered with Duplex adhesive side tape?
- Is h降幅 to intello adhered with Tegen Verse tape?
- Has intello and Tegen Verse tape another patches been installed?

PANEL WALL WINDOW INSPECTION

Automated Inspection Checklists
• Large projects w/multiple dwellings
• Repetitive Tasks – duct & unit by unit leakage testing
• Insulation inspections
<table>
<thead>
<tr>
<th>Item #</th>
<th>Description</th>
<th>Image</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td><strong>2nd Floor Slab Edge Insulation:</strong> Refer to architectural details 20 A-356.</td>
<td><img src="image1" alt="Diagram" /></td>
</tr>
<tr>
<td></td>
<td>Detail 20 shows 4” thick insulation at the slab edge between the CUP and the Residential Tower extending 2” above and below the slab (highlighted area in detail at right).</td>
<td><img src="image2" alt="Diagram" /></td>
</tr>
<tr>
<td></td>
<td>This condition exits at the area highlighted on the plan to the right.</td>
<td><img src="image3" alt="Diagram" /></td>
</tr>
</tbody>
</table>
Progress

- Panel installation started in March
- Finished top floor end of August
- Drywalled up to 13th floor
- Finishes being installed on lower levels
- Majority of effort spent inspecting insulation & air barrier – at least 1x per week since March
Interim Testing

• Ductless mini-splits – no leakage testing required
• Original plan – no whole floor testing
• Revised plan – guarded testing on 4th, 5th and 6th floors
• Window & Door Leakage
• Façade Leakage
• compartmentalization
Guarded Testing

Red line indicates area that needs to be sealed off. Barrier needs to be taped to ceiling, walls and floors for the entire length as well as overlapping seams.

Blower Door Location -
Temporary Air Barrier
Blower Doors on 3 Floors
Façade Leakage
Measurements: Quantitative
Façade Leakage
Measurements: Qualitative
BEACH GREEN NORTH
QUEENS, NY
Wall Insulation Inspections

• ICF doesn’t require as many inspections for insulation
1st Window Mockup
2nd Window Mockup
Duct Sealing on ERVs
Blower Door Test Plan

WHOLE BUILDING INFILTRATION TESTING PLAN
TO DETERMINE COMPLIANCE WITH PHIUS+ AIRTIGHTNESS REQUIREMENTS
AT BEACH GREEN NORTH, 41-19 ROCKAWAY BEACH BLVD., QUEENS, NY

MAY 6, 2016
# Blower Door Test Conditions

<table>
<thead>
<tr>
<th>Intentional Opening</th>
<th>Test Setting</th>
<th>Notes</th>
</tr>
</thead>
<tbody>
<tr>
<td>Windows, doors, skylights and hatches in the building enclosure</td>
<td>Closed and latched</td>
<td></td>
</tr>
<tr>
<td>Dryer doors</td>
<td>Closed and latched</td>
<td></td>
</tr>
<tr>
<td>Doors, hatches and operable windows inside the <strong>test enclosure</strong></td>
<td>Open</td>
<td>Use stairways A &amp; B to connect all zones of the building</td>
</tr>
<tr>
<td>All motorized dampers</td>
<td>Fan off, damper closed but NOT sealed</td>
<td>Penthouse boiler room. Elevator hoistway</td>
</tr>
<tr>
<td>Fire dampers</td>
<td>Remain as found</td>
<td>Ventilation is continuous, so dampers closed and sealed</td>
</tr>
<tr>
<td>ERV’s</td>
<td>Fan off, dampers closed. Ducts to outside sealed inside ERV cabinet.</td>
<td>Penthouse boiler room</td>
</tr>
<tr>
<td>Heat / Cool system</td>
<td>Thermostat to ‘off’, supply and return ducts open &amp; uncovered</td>
<td>Penthouse boiler room</td>
</tr>
<tr>
<td>Combustion appliance flue gas vents</td>
<td>Appliance set to pilot or off Flue left in their as-found position</td>
<td>Penthouse boiler room</td>
</tr>
<tr>
<td>Plumbing traps</td>
<td>Sealed or filled with water</td>
<td></td>
</tr>
</tbody>
</table>
Individual ERV & Blower Door

- Need to seal off ERV for final test.
- Can’t seal off vents from outside.
- Will leave ducts to unit disconnected at first, then connect after testing.
3365 THIRD AVE
BRONX, NY
Complicated Foundations

• Infill site
• Walls near neighbors being poured in stages
• Several foundation inspections needed
Questions?
larena@swinter.com
Come by Our Booth

• High Performance Building Guides available
  – Details for efficient façade attachments
  – Guidance on de-rate for penetrations
  – Product information

Thank you!