Windows Installed into Walls with FPIS and Wood Framing

Window Buck Method

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Background

- There are many acceptable ways to mount and detail windows for support and weather resistance.
- This installation best practice provides only a representative solution for integrating windows with Foam Plastic Insulating Sheathing (FPIS).
- It is the responsibility of the user to verify the appropriateness of any specific detail for their specific conditions.
Scope

• The installation approach featured in this presentation:
  – Is a “window buck” installation concept with window flanges mounted directly over a limited thickness of FPIS.
• Represents a common method for installing windows in walls with generally more than 1-1/2 to 2-inches-thick FPIS.
Scope

• The installation approach featured in this presentation:
  – Uses FPIS as the water-resistive barrier (WRB).
    • Refer to DrJ DRR 1410-05 and the FPIS manufacturer’s installation instructions.
    • Use of a separate WRB material layer is also common and acceptable with appropriate installation and detailing.
Scope

• The installation approach shown includes windows with integral mounting flanges.

• Integral mounting flange windows:
  - Are sometimes referred to as “integral nailing flange,” “integral fin,” or “integral mounting fin.”
  - An integral flange is extruded with the frame and forms one continuous piece around the perimeter.
  - A mounting flange is typically about 1½” wide and is set back about 1” from exterior window face. Fasteners are installed through the pre-punched holes in the flange.
About FPIS

• Three types of FPIS:
  – Expanded Polystyrene (EPS) - ASTM C578
  – Extruded Polystyrene (XPS) - ASTM C578
  – Polyisocyanurate (Polyiso) - ASTM C1289

• R-values ranging from R-4 to more than R-6 per inch.

• Come in many thicknesses, compressive strengths, and densities.
Typical FPIS Applications

• Often used as exterior **continuous insulation (ci)** on buildings to comply with energy codes or for improved performance.
  
  – Can be used as an **air-barrier (AB)** and **water-resistive barrier (WRB)** per manufacturer’s code approvals and instructions.

  – Proprietary FPIS products are also available as a structural insulating sheathing composite for **wall bracing**.
Installation Guidance

- **DrJ Best Practices**
- Window, FPIS, WRB, or Flashing manufacturer’s installation instructions
- An approved design
- The following general installation guidelines
Key Principles

• The intent of any acceptable detail for integrating windows with FPIS is:
  – To provide adequate structural support to the window unit.
  – To prevent water penetration at the window-wall interface by flashing to direct water onto the exterior surface of the WRB layer and/or cladding and away from the window opening.
  – To provide adequate drainage at the window sill for any incidental leakage of water that may still penetrate into the rough opening.
Framing Methods

• There are four typical methods for window framing.

• This program covers the “Lumber Window Buck” method.
Window Buck Installation - Sill

- WINDOW UNIT (SHIM AS REQUIRED AT SILL)
- SEALANT
- SHIMS
- SEALANT (BACKDAM)
- EXTENDED WINDOW JAMB OR DRYWALL RETURN
- 2x WINDOW BUCK (OR EQUAL)
- TRIM
- FRAMING NAIL. FASTENER MUST PENETRATE 1-3/4” INTO WOOD FRAMING
- INTERIOR FINISH
- SILL PAN FLASHING (RECOMMENDED FOR ALL INSTALLATIONS)
- WINDOW NAILING FLANGE WITH BEDDING JOINT SEALANT (INTERMITTENT FOR SILL PAN DRAINAGE) AND SILL PAN FLANGE SEALED CONTINUOUSLY TO DRAINAGE PLANE
- DRAINAGE PLANE
- SIDING
- FPIS / WRB
- WSP SHEATHING (OPTIONAL AS REQUIRED FOR BRACING OR OTHER PURPOSES)
Window Buck Installation - Jambs

- Trim
- Extended Window Jamb or Drywall Return
- Framing
- Interior Finish
- 2x Window Buck (or Equal)
- Sealant
- FPIS Fastener
- Framing Nail. Fastener must penetrate 1-1/2" into wood framing
- Shims
- WSP Sheathing (optional as required for bracing or other purposes)
- FPIS / WRB
- Drainage Plane
- Standard Window Flashing per Window Manufacturer Installation Instructions
- Seal Flange to WRB surface per Window Manufacturer's Installation Instructions
- Termination Joint Tape (Acrylic or Equal)
- Siding
- Window Unit (Shim as required at Jamb)
Window Buck Installation - Header

- SIDING
- SHEATHING / DRAINAGE WRB (FPIS)
- TERMINATION JOINT TAPE (ACRYLIC OR EQUAL)
- ADHERED FLEXIBLE HEAD FLASHING (BUTYL OR EQUAL) (CONTINUOUS TO NAIL FLANGE)
- WSP SHEATHING (OPTIONAL AS REQUIRED FOR BRACING OR OTHER PURPOSES)
- INTERIOR FINISH
- FRAMING NAIL. FASTENER MUST PENETRATE 1-1/4" INTO WOOD FRAMING
- STANDARD WINDOW FLASHING PER WINDOW MANUFACTURER INSTALLATION INSTRUCTIONS
- 2x WINDOW BUCK (OR EQUAL)
- TRIM
- MIN WINDOW HEAD CLEARANCE TO FRAMING
Step 1: Frame Window Opening

- Frame walls as required by the applicable code.
- Ensure window rough opening is square and true.
- Ensure appropriate framing in accordance with window installation method selected and support for FPIS edges is provided.

[Diagram of frame window opening with labels for Top plate, Header, Sill plate, Wall stud, Cripple stud, Bottom plate]
Step 2: Verify and install FPIS

• FPIS material must comply with:
  – ASTM C578 (EPS, XPS)
  – ASTM C1289 (Polyiso)

• Wind pressure resistance
  – See ANSI/SBCA FS-100 for guidance
  – Only required when FPIS not used as oversheathing

ASTM D 1621
Step 2: Verify and Install FPIS

- Drive nails flush and snug with the surface of the insulation board.
- Do not overdrive nails.
- Do not underdrive nails.
- Many FPIS manufacturers recommend use of cap nails.
Step 2: Verify and Install FPIS

- Follow manufacturer’s installation guidelines
- While not prohibited, avoid placing vertical joints in the sheathing over a window head where practical.
- See “FPIS Installation Instructions” program.
Step 3: Verify Flashing and Sealant Materials

- Ensure chemical compatibility of all sealants and flashings with intended substrates; refer to sealant and flashing manufacturer’s data.
- Use flashing tape and sealants recommended by the window and FPIS/WRB manufacturers.
Step 4: Apply Sill Flashing

• Apply all flashings in shingle fashion (e.g., jamb flashing overlaps sill flashing and head flashing overlaps jam flashing).

• Overlap and seal sill flashing at center of sill if a multi-piece sill or pan flashing is used.
Step 4: Apply Sill Flashing

- Alternatively, use a manufactured sill pan to simplify sill drainage installation.

Manufactured Sill Pan
Step 5: Apply Jamb Flashing

- Apply flashing at jambs
Step 6: Apply Head Flashing

- Apply flashing at head
Step 7: Apply Sealant

- Apply sealant at jambs and head (or as required by manufacturer’s install instructions).
- Sill is left open to allow the cavity below the window to drain to the exterior.
Step 8: Install Window Shims at Sill

- Apply setting blocks and/or shims between the rough opening and window frame.
- The window frame must be anchored to the wood rough opening as required by the window manufacturer or in accordance with an approved design for sill support.
Step 9: Install Window

• Install window plumb, level, and square per manufacturer’s instructions.
Step 7: Install Window

• The window frame must adequately bear on the wood sill particularly if using a non-structural flange window.

• Providing adequate sill support is good practice and often required by window manufacturer installation instructions.
Step 8: Verify Window Fasteners

- Window flange fasteners must penetrate a minimum of 1¼” into framing members per IRC 2015.
- Follow manufacturer installation requirements for size and spacing.
Step 9: Install Window Shims

- Apply shims between the rough opening and window frame.
- Anchor the window per the manufacturer’s installation instructions.
Step 10: Apply Jamb Flashing

- Install flashing over the nailing flanges of the jambs to provide a final layer of protection against water intrusion.
- The sill is not sealed, allowing for drainage of the rough opening, back to the exterior.
- Where applicable, install drip cap per manufacturer
Step 11: Apply Head Flashing

• Apply head flashing.
  – Typically, butyl flashing tapes are used for this purpose.

• Overlap window head flange and jamb flashing.
Step 12: Tape Head Flashing

• For extra durability and protection, terminate the top edge of the head flashing tape with the FPIS manufacturer’s approved joint tape.

• Typically, acrylic tapes are used for this purpose.
Step 13: Apply Sealant

- Air seal window around entire perimeter on the interior with sealant or expanding foam made for this purpose.
Step 14: Install Cladding

- See Installation Instructions
  “Attachment of Exterior Wall Coverings Through Foam Plastic Insulating Sheathing (FPIS) to Wood or Steel Wall Framing.”
Additional Reading

• *Fastening Systems for Continuous Insulation*, New York State Energy Research and Development Authority (NYSERDA), April 2010.
• *ASHRAE Journal*, “Windows can be a pain,” Lstiburek, April 2015.