
 SPECIFIER NOTE: The information provided below is intended to guide the Architect in developing specifications for products manufactured by Nvelope Rainscreen Systems, Ltd. and should not be viewed as a complete source of information about the product(s). Refer to MANUFACTURER'S Product Data for additional recommendations and for safety information.

 THIS SPECIFICATION INCLUDES OPTIONS AND CHOICES WITHIN THE TEXT. EDIT ACCORDINGLY.

SECTION 07 05 43
 CLADDING SUPPORT SYSTEMS

PART 1 GENERAL

1.1 SUMMARY

- A. Section Includes: Engineered, tested, thermally-broken, aluminum rainscreen framing assembly at exterior cavity walls.
- B. Related Requirements
 - 1. Section 04 25 00 - Unit Masonry Panels
 - 2. Section 04 42 00 - Stone Composite Panels
 - 3. Section 07 42 43 - Stone Composite Wall Panels
 - 4. Section 07 21 13 - Mineral Board Insulation
 - 5. Section 07 21 16 - Blanket Insulation
 - 6. Section 07 27 26 - Fluid-Applied Membrane Air Barriers
 - 7. Section 07 42 13 - Metal Wall Panels
 - 8. Section 07 42 43 - Composite Wall Panels
 - 9. Section 07 42 47 - Fiber Reinforced Concrete Wall Panels
 - 10. Section 07 62 00 - Sheet Metal Flashing and Trim
 - 11. Section 07 92 00 - Joint Sealants

1.2 REFERENCES

- A. ASTM International (ASTM): <http://www.astm.org>
 - 1. ASTM C954 - Standard Specification for Steel Drill Screws for the Application of Gypsum Panel Products or Metal Plaster Bases to Steel Studs from 0.033 in. (0.84 mm) to 0.112 in. (2.84 mm) in Thickness
 - 2. ASTM C1513 - Standard Specification for Steel Tapping Screws for Cold-Formed Steel Framing Connections.

1.3 International Code Commission (ICC) Evaluation Services:

- 1. ICC ES AC193 - Acceptance Criteria for Mechanical Anchors in Concrete Elements

2. ICC ES AC261 - Acceptance Criteria for Connectors used with Cold-Formed Steel Structural Members
3. ICC ES AC308 - Acceptance Criteria for Post-Installed Adhesive Anchors in Concrete Elements

1.4 ADMINISTRATIVE REQUIREMENTS

- A. Pre-installation Meeting: Pre-installation Meeting: Arrange in conformance to requirements of Division 01
 1. Attendance: Contractor, installer, Owner, Architect, manufacturer's engineer providing curtain wall systems design, manufacturer's technical representative, and those representing related work requested to attend.
 2. Meeting Time: Minimum 2 weeks prior to beginning work of this Section and work of related Sections affecting work of this Section.
 3. Location: Project Site.
- B. Sequencing and Scheduling: Conform to Construction Progress Schedule for Critical Path and scheduling for long lead items and to avoid delaying work.

1.5 SUBMITTALS

- A. Product Data:
 1. Descriptive product literature describing assembly design, performance, and characteristics.
 2. Thermal analysis report indicating assembly U-values for the exterior framing system.
 3. Metal finishes, accessories, and components.
- B. Shop Drawings:
 1. Plans, elevations, framed openings, bearing, details, thermal isolation, fasteners, connectors and anchorage devices, and attachments as needed for project execution.
 2. Interface of aluminum assembly with adjacent construction.
 3. Stamped and signed by licensed professional engineer, registered with the [State] [Province] of [_____].
- C. Samples: Two each of components and fasters for system assembly.
- D. Design Calculations:
 1. Comprehensive analysis of design loads, including dead loads, live loads, wind loads, and thermal movement.
 2. Design shall be sealed by a Professional Engineer licensed in the [State] [Province] of [_____].
 3. Test Data: Independent test results or engineered analysis for performance signed by independent agency representative.
- E. Manufacturer's Instructions: Include installation instructions, clearances, special procedures, and conditions requiring special attention.
- F. Good Standing: Written and signed by manufacturer's agent indicating installer as in good standing and approved to erect work of this Section.
- G. Sample Warranty: Meet or exceed provisions specified by this Section.

1.6 QUALITY ASSURANCE

A. Manufacturer Qualifications:

1. Able to document minimum 5 years of experience designing and supplying work of this Section.
2. Maintain locally available technical product representation available to meet at project site as needed for meetings and inspections of work.

B. Installer Qualifications:

1. Trained and authorized by manufacturer as qualified to install work of this Section.
2. Employ full-time on-site superintendent or foreman to overseeing installation during work of this Section.
3. Able to show successfully completed projects of equivalent scope and quality upon request by Architect.

C. Mock-Ups: Provide under Quality Assurance provisions of Division 01.

1. Mock up complete system at location as directed by Architect.
2. Provide as required to illustrate substrate, air barrier, insulation, framing, flashing, thermal isolation, and treatments at fenestrations, corners, and transitions.
3. Verify mock-up as conforming to manufacturer's instructions and provisions of Contract Documents.
4. Do not begin work of this Section until after inspection by manufacturer's representative is complete and mock-up has been accepted in writing by Architect.
5. Protect and maintain accepted mock-up as standard of quality for work of this Section.
6. Accepted mock-ups may be incorporated into the work of this Section.

1.7 DELIVERY, STORAGE, AND HANDLING

A. Conform to provisions of Division 01 and manufacturer's instructions.

B. Ordering: Conform to manufacturer's ordering instructions and lead time requirements to avoid construction delays.

C. Delivery: Deliver materials in manufacturer's original, unopened, undamaged containers with identification labels intact.

D. Store and handle to keep clean, dry, and protected from damage due to weather and construction activities.

1.8 FIELD CONDITIONS

A. Site Environmental Requirements: Do not install materials until site conditions conform to manufacturer instructions.

1.9 WARRANTY

A. Conform to Warranty requirements specified by Division 01.

B. Manufacturer: 15-year materials warranty covering defective materials of extruded aluminum framing system.

1.10 SOURCE QUALITY CONTROL

A. Single Source Responsibility: Furnish engineered design and fabrication by or under direct responsibility of single manufacturer.

B. Field Measurements:

1. Verify conditions prior to preparing shop drawings and beginning fabrications.
2. Where this is not practical, verify with dimensions shown on shop drawings and mark corrections prior to installation.

PART 2 PRODUCTS

2.1 MANUFACTURERS

- A. Quality Standard: Nvelope, NV1-System (Vertical/Exposed Fastener) Series Rainscreen System, thermally insulated and isolated between metal components and substrate, specified as basis of design.
- B. Quality Standard: Nvelope, NV3-System (Concealed Fastener) Series Rainscreen System, thermally insulated and isolated between metal components and substrate.
- C. Quality Standard: NH2-System (Horizontal/Exposed Fastener) Series Rainscreen System, thermally insulated and isolated between metal components and substrate.
- D. Quality Standard: NV7-System (Cassette Support) Series Rainscreen System, thermally insulated and isolated between metal components and substrate.
 1. Tel (206) 226-2311, Email info@NvelopeUSA.com (Dave Sommer)
 2. Web Site: <http://www.nvelope.us>
- E. Substitution Requests: As specified by Section 01 25 00.

2.2 REGULATORY REQUIREMENTS

- A. Design and Structural Properties: Conform to provisions of 2012 International Building Code (IBC) including IBC Section 1604.3.3 and IBC-2012 Section 2211 including applicable referenced AISI specifications and standards, including following as applicable.
 1. AISI S100.
 2. AISI S200.
 3. AISI S211.
 4. AISI S212.
 5. AISI S213.

2.3 PERFORMANCE / DESIGN CRITERIA

- A. Structural Design: Provide engineered design capable of withstanding combined effects of stresses from dead loads, wind loads, normal thermal movement, and other anticipated stresses without evidence of permanent defects or failure.
 1. Wind Load: Uniform pressure (velocity pressure) as indicated on Structural Drawings, acting inward or outward.
 2. Dead Loads: Design for loading to accommodate support of cladding systems specified by related sections and shown on Drawings and as required by applicable building code.
 3. Seismic Loads: Design and size components to withstand seismic loads and sway displacement.
- B. Thermal Expansion and Contraction: Design for movement due to cyclic day and night temperatures to not exceed safety factors for fasteners, joints, seals, and components.

- C. Cladding Accommodation: Design framing support assembly to maintain dimensions to face of cladding materials indicated on Drawings. Design framing supports configuration, size, spacing, and make adjustments as needed to accommodate support for each cladding type, including:
1. Unit Masonry Panels specified by Section 04 25 00
 2. Stone Composite Panels specified by Section 04 42 00
 3. Stone Composite Wall Panels specified by Section 07 42 43
 4. Metal Wall Panels specified by Section 07 42 13
 5. Composite Wall Panels specified by Section 07 42 43
 6. Fiber Reinforced Concrete Wall Panels specified by Section 07 42 47
- D. Rain Screen Design: Design ventilating system assembly to accommodate movement of air movement into the rain screen cavity and move water vapor out.
- E. Tolerances:
1. Accommodate deflection of structural members.
 2. Maintain clearances at adjacent construction.
 3. Prevent load transfer to non-structural elements.
- F. Thermal Barriers:
1. Thermally isolate metal components from each other and support wall.
 - a. Maximum contact area between isolator and sheathing: 3.15 square inches
 - b. Maximum thickness: 0.375 inches
 - c. Shims that may be used for plumb and true alignments must not increase thermal isolation contact area.
 2. Thermally isolate fasteners from metal using thermal isolation washers or other means.
 - a. Minimum thickness: 0.125 inches
- G. Thermal Insulation: As specified by Section 07 21 13.
1. Design thickness and type of insulation into system assembly.
 2. Perform thermal analysis to determine framing systems effect on wall assembly.
- H. Effect on Wall Assemblies Thermal Resistance: Framing system must not degrade complete wall assemblies thermal resistance by more than 17 percent and conform to ASHRAE 90.1 prescriptive U-value of wall assembly for appropriate climate zone.
1. Three dimensional computer simulated thermal analysis or guarded hot-box test (ASTM C1363-11) results required.
- 2.4 EXTRUDED ALUMINUM SUB-FRAMING:
- A. Gauge, Configuration, Dimensions, and Spacing: Minimum gauge and as required to conform to design criteria for each assembly.
- Material: Alloy - 6005A T6 (former designation AlMgSi 0,5 F25) appropriate for rainscreen cladding support / construction
- B. Wall Brackets:
1. Single brackets have a height of 75 mm and the double brackets, 150 mm Pre-Punched Holes: For minimum two wall anchors per bracket.
 2. Stem for Connecting Rail to Bracket: Must not penetrate exterior layer of insulation.

- a. Small bracket dimensions: 3 inch (h) and 2.5 inch (w). Plate thickness of 6.5mm for steel and wood frame, 11mm for concrete or CMU substrate.
 - b. Large bracket dimensions: 6 inch (h) and 2.5 inch (w). Plate thickness of 6.5mm for steel and wood frame, 11mm for concrete or CMU substrate.
 - c. Pre-punched Holes: For easy engagement and placement of stainless steel self-tapping hex-head screws for use in attaching vertical rail.
 3. Dimensions: As needed to offset cladding from wall plane where meeting substrate and to allow for installation of insulation equal in thickness to offset.
 - a. Offset Brackets – 40mm,60mm,90mm,120mm,150mm, 180mm,210mm, 240mm,270mm,300mm depths with up to 40mm of adjustment on the vertical axis.
 - 1) Align offsets to differing wall planes as shown on Drawings.
 4. Recommended Product: Nvelope Thermal Isolator (color: green)
 - C. Vertical Rail: Minimum 2.2mm thick extruded aluminum
 1. Profile: L rail for vertical furring members.
 2. Nominal Dimensions: 60mm leg and 40mm leg
 3. Profile: T-section for vertical furring members.
 4. Nominal Dimensions: (T60-80) 60mm leg and 80mm face. (T60-100) 60mm leg and 100mm face. (T40-100) 40mm leg and 100mm face. (T60-120) 60mm leg and 120mm face. (T60-140) 60mm leg and 140mm face.
 5. Profile: U-Section: (HBL60-40) 60mm leg and 40mm face. 2.5 mm thickness.
 6. Profile: Z-Section: (Z25-45-30) 25mm face and 45mm leg and 30mm face. (Z40-45-55) 40mm face and 45mm leg and 55mm face. 2.4 mm thickness.
 - D. Horizontal Rail (NV3 only): Nominal 2.5mm thick extruded aluminum
 1. Profile: (CP-NV3-3000) Horizontal Rail
 2. Dimensions: 60mm (h) and 25mm (depth). Intermittent cleat fixed to cladding panel are mate to horizontal rail. When engaged, total depth is 26mm.
 3. Attachment Holes: Cleats are factory-punched to accommodate fastener spacing and dimension.
 - a. Oversize holes to allow for thermal contraction and expansion of rail.
- ## 2.5 THERMAL BARRIER
1. Material: Injection molded Polypropylene copolymer.
 2. Size: To accommodate plate.
 - a. Framing member to framing member isolation: minimum 0.125 inch thick
 - b. Isolator must match support bracket and must not decrease structural performance of system.
 3. Recommended Product: NV-T1 or NVT2 Thermal Isolators by Nvelope USA, LLC or approved equivalent, or recommended by system manufacturer.

2.6 CONNECTORS AND ANCHORS

- A. Connectors used with Cold-Formed Steel Framing Members: Conform to ICC ES AC261
- B. Screw Fasteners: Stainless steel as instructed by manufacturer.
 - 1. Thermoset Polyester coating that exhibits 1,000 hours of salt spray beyond stainless steel anti-corrosiveness.
 - 2. Minimum No. 14 self-drill hex-head screw fastener to be used to attach horizontal rail to vertical rail.
 - 3. Steel Studs:
 - a. Self-drill hex-head TEK screw fasteners of sufficient length
 - b. Minimum three threads must penetrate steel stud members.
- C. Concrete and Masonry Wall Anchors: Mechanical and Adhesive anchors, bolts, nuts, and washers suited to use and as required for transference of design loads.
 - 1. Mechanical Anchors: Expansion type, conforming to ICC ES AC193.
 - 2. Adhesive Anchors: Torque Controlled, conforming to ICC ES AC308

2.7 ACCESSORIES

- A. Bracing, Furring, Bridging, Plates, Gussets, and Clips: Formed sheet steel or fiberglass, thickness as necessary to meet structural requirements for special conditions encountered.
- B. Galvanic Protection: Utilize tapes and other methods as necessary to separate and prevent contact between dissimilar metals.

PART 3 EXECUTION

3.1 EXAMINATION

- A. Verify conditions ready to receive work of this Section before beginning.
- B. Backup Wall: Verify level and plumb, free of defects, and conforming to tolerances suitable for installation of subsequent work.
- C. Weather Resistive Barrier: Verify complete, cured, and conforming to manufacturer's instructions. Verify fenestrations, transitions, discontinuities, and sills and ledgers flashed and sealed to move moisture to exterior of building as part of air barrier system.

3.2 PREPARATION

- A. Review areas of potential interference and conflicts, and coordinate layout and support provisions for interfacing work.
- B. Adjust and perform work as necessary for plumb and true alignments.

3.3 INSTALLATION

- A. Conform to manufacturer's instructions and provisions of Contract Documents.
- B. Erect cold-formed rain screen assembly to be level, plumb, and in alignment with building features including corners, off-sets, and fenestrations.
- C. Wall Brackets and Vertical Rail:
 - 1. Mount wall brackets at 16 inch on center horizontally on support wall (at each stud location), using self-drilling self-tapping screws at metal stud framed walls and expansion or adhesive anchors at concrete and masonry walls.
 - a. Lay brackets out at an even 0.5 inch increment vertically or horizontally.
 - b. Tighten snug tight, approximately 90 in/lbs of torque, and as instructed by fastener manufacturer instructions.
 - c. Where using snug tight criteria, verify torque for each installer using hand tools at beginning of project.
 - 2. Thermally isolate wall bracket attachments by sandwiching thermal break material between metal bracket and support wall substrate.
 - 3. Isolate screw fastener washers using material to thermally isolate fastener heads from metal bracket.
 - 4. Attach horizontal rail to wall bracket stem by use of a self-tapping screw fastener through the pre-punched holes in the rail and into the pre-punched pilot holes on the bracket.
 - 5. Isolate horizontal rail from bracket by sandwiching a thermal break material between rail and bracket stem.
 - 6. Place shims the same size and profile as the isolator between the sheathing and bracket isolator to account for irregularities in support wall.
 - 7. Establish and re-establish and restart vertical bracket locations using laser or chalk-line at fenestrations and other obstructions to establish horizontal alignments. Brackets must be placed at 0.5 inch increments vertically or horizontally.
- D. Horizontal Rail:
 - 1. Space to make suitable bearing surfaces for each cladding system as instructed by manufacturer and as shown on Architect accepted shop drawings.
 - 2. Begin at bottom and mount to vertical rails using No. 14 self-drilling self-tapping stainless steel screws.
 - 3. Tighten screws to snug tight, typically between 90-95 in/lbs of torque. Verify equivalent snug tight condition for installers using hand tools.
 - 4. Install successive horizontal rails as required for panel type.
 - 5. When encountering fenestrations and other openings, mount horizontal rails so that fastening points are as close to the lower and upper edges as possible.
- E. Semi-Rigid Mineral Wool Insulation: Install to expand into and tightly fit between wall brackets to make continuous, unbroken insulated face of wall as specified by Section 072116.
- F. Touch-up shop-applied protective coatings damaged during handling and installation.

- G. Use shearing instruments (i.e. snips, nibbler, etc.) for cutting metal framing components. Saws are not recommended, as the sparks produced during cutting will damage the anti-corrosion coating. If saws are used, surrounded metal coating **MUST** be protected from sparks.
 - H. Cut installed vertical rails to minimum 12 inch lengths and mechanically attach to at least two separate wall brackets.
 - I. Cut installed horizontal rails to minimum 12 inch lengths and mechanically attach to at least two separate vertical rails to prevent rotation of rail.
 - 1. At unsupported span of installed horizontal rails that extend past closest vertical rails, do not exceed 7.5 inch in length for 16 inch on center spaced studs or 11.5 inch in length for 24 inch on center spaced studs.
 - 2. At opening jambs (i.e. windows, doors, and other fenestrations) do not extend the horizontal rails past vertical rails by more than 3 inch in length.
- 3.4 ERECTION TOLERANCES
- A. Maximum Framing Member Variation from True Position: 1/8 inch.
 - B. Maximum Framing Member Variation from Plane:
 - 1. Individual Framing Members: Do not exceed 1/8 inch in 10 foot.
 - 2. Accumulative Over-all Variation for Wall and Floor System: Do not exceed 1/8 inch.
- 3.5 FIELD QUALITY CONTROL
- A. Manufacturer's Field Technical Service: Make intermittent and final inspection to verify installation in conformance to manufacturer instructions and suitable as framing assembly for subsequent metal panels, acrylic plastering, and other cladding installations.
 - 1. Confirm snug tight and fastener sizing.
 - 2. Confirm framing members installed in correct orientation.
- 3.6 ADJUSTING
- A. Inspect and adjust after installation. Replace or repair defective work.
 - B. Adjust, and reconfigure as necessary to accommodate cladding systems for installations over work of this Section. Do not reuse pre-drilled holes unless fastener size is increased.

END OF SECTION 07 05 43