SECTION 054043
COLD-FORMED METAL RAIN SCREEN ASSEMBLY

SPEC NOTE: This guide specification is intended for use when specifying Knight Wall Systems' cold formed metal support/attachment framing to provide ASHRAE 90.1 compliant U-value rain screen walls.

DISCLAIMER: The manufacturer has reviewed the product information contained in this guide specification. The information is organized and presented to assist the specification writer working on a construction project to select the appropriate products and to save time in writing the project specification Section. The specification writer is responsible for product selection as well as the use and application of this information, and should contact the manufacturer to ensure that all options are available and that the associated specification information is valid and correct.

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Written around Knight Wall Systems LevelTek, thermally isolated, cold-formed framing system.

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Items in highlighted brackets [ ] are either optional or require project specific input by specifier

PART 1 GENERAL

1.1 SUMMARY

A. Section Includes: Engineered, thermally-broken, continuously insulated, self-shimming, cold-formed metal rain screen framing assembly at exterior cavity walls.

B. Related Requirements:

1. Section 033000 - Cast-In-Place Concrete
2. Section 042200 - Concrete Unit Masonry
3. [Section 044200 - Exterior Stone Cladding]
4. Section 072114 - Semi-Rigid Mineral Wool Insulation
5. Section 072726 - Fluid-Applied Membrane Air-Vapor Barriers
6. [Section 076000 - Flashing and Sheet Metal]
7. [Section 079200 - Joint Sealants]
8. [Section 074200 - Exterior Finish Wall Panels]
9. [Section 074213 - Metal Wall Panels]
10. [Section 092400 - Portland Cement Plastering (Stucco)]

1.2 REFERENCES

A. Reference Standards: Conform to provision of Section 014219.

B. [American Iron and Steel Institute (AISI):

1. AISI S100 - North American Specification for the Design of Cold-Formed Steel Structural Members
2. AISI S200 - North American Standard for Cold-Formed Steel Framing - General Provisions
3. AISI S211 - North American Standard for Cold-Formed Steel Framing - Wall Stud Design
4. AISI S212 - North American Standard for Cold-Formed Steel Framing - Header Design
5. AISI S213 - North American Standard for Cold-Formed Steel Framing - Lateral Design]

C. ASTM International (ASTM): http://www.astm.org

1. ASTM A792 - Standard Specification for Steel Sheet, 55% Aluminum-Zinc Alloy-Coated by the Hot-Dip Process.
2. 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
3. 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 AC46 - Acceptance Criteria for Cold-Formed Framing Members
2. ICC ES AC193 - Acceptance Criteria for Mechanical Anchors in Concrete Elements
3. ICC ES AC261 - Acceptance Criteria for Connectors used with Cold-Formed Steel Structural Members
4. ICC ES AC308 - Acceptance Criteria for Post-Installed Adhesive Anchors in Concrete Elements]

1.4 ADMINISTRATIVE REQUIREMENTS

A. Coordination: Conform to Section 013113 for coordination with work of related Sections.

1. Sections 033000 and 042200 for connections to concrete and masonry wall construction.
2. Sections 044200, 074213, and 092400 for support of [stone cladding,] metal wall panels, and Portland cement plaster systems.
3. Section 072114 for mineral wool insulation criteria specified by that Section [for installation into work of this Section.]
4. Section 072726 for fluid-applied air barrier system installation with penetration fasteners to maintain integrity of air barrier system.

B. Pre-installation Meeting: Preinstallation Meeting: Arrange in conformance to requirements of Section 013119.

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] [3] [4] weeks prior to prior to beginning work of this Section and work of related Sections affecting work of this Section.
3. Location: Project Site.

C. Sequencing and Scheduling: Conform to Section 013216 to meet Construction Progress Schedule for Critical Path and scheduling for long lead items and to avoid delaying work.

1.5 SUBMITTALS

A. Conform to submittal requirements of Section 013300.

B. Product Data:

1. Descriptive product literature describing assembly design, performance, and characteristics.
2. Metal finishes, accessories, and components.

C. Shop Drawings:

1. Plans, elevations, framed openings, bearing, details, thermal isolation, fasteners, connectors and anchorage devices, and attachments.
2. Interface of cold-formed assembly with adjacent construction.
3. Stamped and signed by licensed professional engineer, registered with the State of Washington [_____].

D. Samples: Two each of components and fasters for system assembly.

E. Design Calculations:

1. Comprehensive analysis of design loads, including dead loads, live loads, wind loads, and thermal movement.
2. Stamped and signed by licensed professional engineer, registered with the State of Washington [_____].

F. Test Data: Independent test results or engineered analysis for thermal and seismic performance signed by independent agency representative.

G. Manufacturer's Instructions: Include installation instructions, clearances, special procedures, and conditions requiring special attention.

H. Certification: Written and signed by manufacturer's agent indicating installer as trained and approved to erect work of this Section.

I. Sample Warranty: Meet or exceed provisions specified by this Section.

1.6 QUALITY ASSURANCE

A. Manufacturer Qualifications:

1. Able to document minimum 5 years experience designing and supplying work of this Section.
2. Employ licensed professional engineering personnel experienced in work of this Section and registered in State of Washington.
3. 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 Section 014300.

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 Section 016510 and manufacturers 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 Section 017836.

B. Manufacturer: Standard 10-year [20-year when used in conjunction with Knight Series panels] materials warranty covering defective materials of cold-formed metal 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. Recommended Product: Knight Wall Systems, LevelTek Rain Screen Leveling System, thermally insulated and isolated between metal components and substrate.

1. Tel (509) 262-0104, Email brian@knightwallsystems.com (Brian Nelson)
2. Tel (509) 262-0104, Email info@knightwallsystems.com / sales@knightwallsystems.com
3. Web Site http://www.knightwallsystems.com

B. Or approved equal.

C. Substitution Requests: Conform to provisions of Section 012500.

2.2 REGULATORY REQUIREMENTS

A. Conform to regulatory requirements specified by Section 014100.

B. Design and Structural Properties: Conform to provisions of 2009 International Building Code (IBC) including IBC Section 1604.3.3 and IBC-2009 Section 2210 including applicable referenced AISI specifications and standards.

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) of (Insert Design Criteria) lb/sq ft. (Insert Design Criteria), 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 supports configuration, size, spacing, and make adjustments as needed to accommodate support for each cladding type, including:

1. Panels specified by Section 074200.
2. Portland cement plaster specified by Section 092400.

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.
4. System allows vertical adjusting to make plumb and in alignment with adjacent construction as needed without the use of separate plastic shims or similar.

F. Thermal Barriers:

1. Thermally isolate metal components from each other and support wall.
2. Thermally isolate fasteners from metal using thermal isolation washers or other means.

G. Thermal Insulation: As specified by Section 072113.

1. Design thickness and type of insulation into system assembly.
2. Perform thermal analysis to determine actual thermal U-factor for system assembly as a whole.

2.4 COLD-FORMED STEEL METAL FRAMING:

A. Cold-Formed Steel Framing Members: Conform to ASHRAE 90.1 presecirptive U-value of wall assembly for appropriate climate zone.

B. Gauge, Configuration, Dimensions, and Spacing: Minimum 18 gauge and as needed to conform to design criteria for each assembly.

C. Hot-Dip 55% Aluminum-Zinc Alloy-Coating: ASTM A792, Commercial Steel (CS), Grade B, Coating Designation AZ50.

D. Wall Brackets:

1. Minimum 0.068 inch thick (14 gage) sheet steel.
2. Slots: For anchoring self-drilling [_____] screws [_____] to substrate
3. Threaded Drill Holes: For engaging M8 (8mm) hex head socket screws for use in attaching vertical girt.
    a. Double thickness of bracket metal at of drill-hole locations.
    b. Spaced appropriately to maintain proper alignment of vertical girts
4. Dimensions: As needed to offset brackets from wall plane where meeting substrate and to allow for installation of insulation equal in thickness to offset.
    a. Offset Brackets – Minimum 4.7 inch high and 1.5 inch wide
    b. Offset Brackets – 2, 3, 4, 5 or 6 inch depth.
        1) Align offsets to differing wall planes as shown on Drawings.
5. Recommended Product: TekBracket by Knight Wall Systems or approved equivalent

E. Vertical Girt: Minimum 0.0466-inch thick (18 gauge) cold-formed steel.

1. Nominal Dimensions: 2 inch at sides attaching to wall bracket and 1.2 inch at face.
2. Elongated Slots: 4 inch on center along length of track allowing for aligning and plumbing of vertical framing, independent of substrate irregularities.
    a. Minimum adjustment 1 inch.

3. Threaded Holes: Locate regularly spaced in vertical girt indented to double thickness of metal at opening to facilitate M8 screw attachment of horizontal rail.
4. Recommended Product: SL-Girt by Knight Wall Systems or approved equivalent

F. Horizontal Rail: Nominal 0.0466 inch thick (18 gauge) cold-formed steel.

1. Profile: J configuration
2. Dimensions: 1.125 inch front leg, 0.75 inch at base and 1.875 inch back leg.
3. Weep Drains: 0.75 inches diameter at 2 inches on center along base to allow for drainage.
4. Attachment Slots: Locate at 2 inches on center along back to facilitate M8 screw attachment to vertical girt.
    a. Minimum 0.50 inch lateral adjustability
5. Recommended Product: RS-Rail by Knight Wall Systems or approved equivalent

2.5 COLD FORMED FRAMING THERMAL BARRIER

1. Material: Injection molded Polyoxymethylene copolymer (POM)
2. Size:
    a. Washer Isolation: Designed to thermally isolate fastener heads from metal, minimum 0.125 inch thick
    b. Framing member to framing member isolation: minimum 0.125 inch thick
    c. Support wall substrate isolation: minimum 0.625 inch thick at each wall bracket.
3. Recommended Product: ThermaStop™ Isolators by Knight Wall Systems or approved equivalent

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 panel manufacturer.

1. Socket Screws: M8, hex socket head, stainless steel, for attachment of horizontal rail to vertical girt, vertical girt to wall bracket and as instructed by manufacturer.
2. Steel Screws: No. 14, hex-head screws, and washers for attaching wall bracket into steel stud framed wall assemblies with minimum 3/8 inch penetration into steel stud members.
    a. Steel Tapping Screws: ASTM C1513.
    b. Steel Drill Screws: ASTM C954.

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, 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. Air / Water 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. Shim 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 Girt:

1. Mount wall brackets at 16 [24] inch on center over cured air barrier on support wall, using self-tapping screws at metal stud framed walls and expansion or adhesive anchors at concrete and masonry walls.
    a. Tighten to 125 in/lbs of torque and as instructed by fastener manufacturer instructions.
    b. Where using snug tight criteria, verify torque for each installer using hand tools at beginning of project.
2. Thermally isolate wall bracket and vertical girt attachments by sandwiching thermal break material between metal and support wall substrate.
3. Isolate washers using material to thermally isolate fastener heads from metal.
4. Adjust fasteners in slotted fastener holes to align plumb and true. Account for irregularities in support wall.
5. Establish and re-establish and restart vertical bracket locations using laser or chalk-line at fenestrations and other obstructions to establish horizontal alignments of screw holes for horizontal rail.

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 girts using M8 screws.
3. Tighten screws to between 90-100 in/lbs of torque. Verify equivalent snug tight condition for installers using hand tools.
4. Install successive horizontal rails.
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 072114.

F. Touch-up shop-applied protective coatings damaged during handling and installation.

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, Portland cement plaster, and other cladding installations.

1. Spot-check torque on M8 hex socket screws.
2. Confirm framing members plumb.

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.

END OF SECTION