### Exposed and Accessible Exterior Metal Surfaces, including Steel Support Members and Associated bolts, Nuts, and Washers for Supports and Bracings

**Category**

**System**

**Recommendation**

Any exposed exterior metal surface, including steel support members and associated bolts, nuts, and washers for supports and bracings shall be stainless steel (316L) construction.

- Steel support members and associated bolts, nuts, and washers for supports and bracings shall be hot dipped galvanized steel or stainless steel construction.

Exposed and accessible exterior metal surfaces shall be protected with a water-reducible acrylic with stainless steel pigment spray-applied over the manufacturer’s standard finish. The spray coating thickness shall be 2-4 mils and provide minimum salt-spray resistance of 2,000 hours (ASTM B117) tested at 85°F and 95% relative humidity as per ASTM B-117.

**Architectural**

**Doors**

Exterior doors shall be of hollow metal steel, minimum (fiberglass acceptable in lieu of steel). Hollow-Metal Steel shall be 16-gage, hot-dipped galvannealed steel, with mineral-board or vertical steel-stiffener core, closed (flush or inserted) 0.042-inch thick top and bottom edges (tops shall be without holes or openings; bottoms shall have weep holes), of extra heavy duty high-traffic, seamless construction (Level 3, Physical Performance Level A, Model 2 per ANSI A250.8 and A250.4). Hardware reinforcement shall also be hot-dipped galvannealed sheet of the same material as door face sheets. Doors shall have factory-installed self-adjusting, concealed door sweep in the bottom channel (bottom seal shall not include springs) and factory-reinforced hardware cutouts.

**Door Frames**

Exterior door frames shall be commercial grade (ANSI A250.8), heavy-duty rated for high humidity/weather exposure, be of hot-dipped galvannealed steel (A60 zinc-iron alloy coating minimum to meet ASTM A653), 16-gage minimum, welded style with die-mitered corners and backed-on rust-inhibiting factory finish (ANSI A250.10). Where fire rating is required, frames shall meet NFPA 80 requirements for the specified rating. Frame reinforcement shall also be hot-dipped galvannealed.

**Window Systems**

Window frames shall be of pultruded fiberglass meeting AAMA/WDMA/CSA 101/S.2/A440 performance class CW, minimum, and AAMA 623-10 for factory-finish enamel coating on exposed exterior surfaces. (Fiberglass interior/exterior and fiberglass exterior with wood cladding interior are both acceptable styles.) Hardware shall be fabricated from corrosion-resistant material compatible with adjacent materials and be designed to smoothly operate, tightly close, securely lock, and be sized appropriately for sash weight and size. Frames shall have full-perimeter, factory-installed, integral weatherstripping. Fasteners for installation shall be non-corrosive and compatible with frame materials and associated window system components. Exposed fasteners are not acceptable. All window systems shall be double-glazed, minimum. Glazing shall meet ASTM C1036, Type 1, Class 1, q3 with insulated glass units meeting IGCC/ASTM E2190 and having low-e coating sputtered on the second or third surface. Windows shall meet all fire and egress code requirements and have the following performance characteristics: U > 0.41, SHGC < 0.25, with highest VT possible to meet best daylighting conditions and energy efficiency recommendations for Climate Zone 3 (per ASHRAE AEDG-50). (Note: if project is outside of California, or in Humboldt or Del Norte Counties in California, please refer to ASHRAE's Advanced Energy Design Guide (AEDG) for K-12 School Buildings.) 10-year minimum warranty for frames and glazing.

**Rain Gutters**

Gutters shall be 20 ounce (minimum) copper, pre-patinated to have “weathered” look prior to installation (bright copper finish is not acceptable). Gutter shall be half-round style, 5” minimum, with double bead profile preferred (single bead acceptable where required by adjacent construction). (Note: Exact gutter sizing may vary by project, and should be based on location, roof slope, length of run, and spacing and size of outlet openings.) Where copper is unacceptable to Authorities Having Jurisdiction, gutters shall be hot-dipped galvannealed steel, 24-gage minimum, with painted finish. Gutters shall be installed with longest continuous pieces possible with hidden hangers of material identical to gutter. Fasteners shall be screws of similar material; pop rivets are unacceptable.

**Downspout**

Downspouts shall be 20 ounce (minimum) copper, pre-patinated to have “weathered” look prior to installation (bright copper finish is not acceptable). Downspout shall be smooth round or rectangular welded style, 3” minimum in greatest dimension. (Note: Exact downspout sizing may vary by project, and should be based on location, roof slope, spacing of downspouts, and gutter configuration.) Where copper is unacceptable to Authorities Having Jurisdiction, downspouts shall be hot-dipped galvannealed steel, 24-gage minimum, with painted finish. Downspouts shall be installed with longest continuous pieces possible with surface straps of matching material. Fasteners shall be covered with “buttons” of material matching downspout and straps; exposed nails, screws, and pop rivets are unacceptable.

**Metal Flashings**

Flashing material shall be 20 ounce (minimum) copper, pre-patinated to have “weathered” look prior to installation (bright copper finish is not acceptable). Where copper is unacceptable to Authorities Having Jurisdiction, flashing shall be hot-dipped galvanized steel, 20-gage minimum. All flashing shall be of continuous pieces to match item/edge being flashed (multiple pieces or patching of product per side not acceptable). Flashing shall be installed with stainless steel screws (316L preferred). Pop rivets are unacceptable.

**Screws**

Screws shall be 316L stainless steel wherever exposed to weather elements. If 316L is unavailable, 316 stainless steel is acceptable, but requires protection in the form of two coats of commercial grade, exterior type anti-corrosive paint.

**Nails**

Nails shall be 316L stainless steel wherever exposed to weather elements. If 316L is unavailable, 316 stainless steel is acceptable, but requires protection in the form of two coats of commercial grade, exterior type anti-corrosive paint.

**Guy-wires**

Guy wires or other support wire exposed to the elements shall be 316L stainless steel.
### Architectural Paints and Coatings
- Exterior paint selection is dependent on substrate being finished, but shall meet the following general requirements for product characteristics and performance:
  - Low- or no-VOC content (GreenSeal GS-11, SCAQMD Rule 1113), commercial grade minimum (light industrial coatings preferred if substrate allows), UL-V
  - Stable anti-fading, corrosion-resistant (if applied to metal substrate), single component, water-based paint. Eggshell, minimum, sheen for non-metal surfaces, with semi-gloss, minimum, sheen for metal surfaces. General primers/sealers shall be alkali-resistant. Metal primers shall be alkyl, anti-corrosive and/or waterborne for galvanized metal. Minimum one full coat of primer plus two full coats of top/surface paint. If sealer is used on top of paint, one coat minimum is required. For wood sealers, two coats minimum are required.

### Roof
- Roofing material selection is dependent on roof slope and style, but shall be mechanically fastened TPO (60 mil, minimum) or APP modified-bitumen sheet (60 mil, minimum) for flat-to-low-slope, with or without parapet; or concrete, fiber-cement, slate, metal, rubber/polymers for steep-slope surfaces. All roof surfaces shall meet fire/life safety and cool roof requirements, as well as any other requirements of Authorities Having Jurisdiction (note: verify R-value requirements for roofing materials and/or associated insulation). All selected materials shall meet the following general requirements for product characteristics and performance:
  - Durable, low-maintenance, water-proof, fire-, mold-, moisture-, mildew-, fungal- and vermin-resistant, with UV-inhibitor/non-fading integral or factory-applied finish coatings. If metal-based, metals shall be galvannealed, galvanized, or stainless steel, and be anti-corrosive, rust-resistant. Wood of any style, hot-mopped asphalt, and bituminous shakes or shingles are not acceptable. Minimum warranty is 20 years for flat-to-low-slope; 30 years for steep-slope.

### Insulation
- Insulation for exterior cavity walls is dependent on wall cavity dimension and exterior finish/surface systems/materials, but shall be of unfaced mineral-wool board (meeting ASTM C612, ASTM E84, and ASTM E136) or unfaced mineral-wool blanket (meeting ASTM C685, Type I, ASTM E84 (25 & 50 flame and smoke rating, respectively), and ASTM E136). Insulation shall be installed with adherence-attached spindle/anchor system and fill cavity full without being stretched, crushed, or leaving gaps. Minimum cavity R-value is 13 or as required by Authorities Having Jurisdiction based on location and wall or roof system type. R-19 is recommended if cavity depth allows (R = 3.5 per inch or greater). Insulation shall meet all fire/life safety requirements (NFPA 101, Class A rated interior finish, minimum) and be recommended for sound/noise absorption and be mild-, moisture-, mildew-, and vermin-resistant.

### Siding
- Siding materials will be project-specific, dependent on a number of variables, but shall be of durable, anti-corrosive, rust-resistant, mold-, moisture-, mildew-, fungal- and vermin-resistant material (fiber-cement, metal, stucco) and meet all code requirements for fire/life safety (ASTM E136, ASTM E84 with flame-spread index of 25, maximum). Proper substrate and surface preparation, including weep holes, rain screen systems, and air or vapor barriers, and/or waterproofing systems will be required and shall be as acceptable to manufacturer of the finish system. Siding shall be factory-finished with UV-, corrosion-, rust-resistant baked-on finish when available (i.e., availability is determined by siding material, not manufacturer).

### Door Hardware - Hinges
- All door hinges shall be of stainless steel (316L, preferred), of heavy weight construction, and full mortise style.

### Door Hardware - Locksets
- All door locksets shall be cylindrical or mortise style, ANSI Grade 1, rated for heavy duty traffic (exceeding ANSI A156.2 requirements), meeting ADA and Cal/ requirements, with 10-year minimum warranty. The lockset shall of pressure cast zinc construction (wrought brass for associated rose is acceptable) with a full size interchangeable core (6-pin, E keyway, or as matches campus master), steel throw, entrance/office or corridor style locking function for enhanced safety, and square corner box strike.

### Door Hardware - Protection Plates
- All door protection plates (kick plates) shall be 0.057 thick minimum stainless steel (brass acceptable with University approval for specific installation; case-by-case basis).

### Door Hardware - Thresholds
- All exterior door thresholds shall be ADA compliant, slip-resistant, commercial grade, heavy-duty rated for high-traffic/high weight-bearing applications, cone condition/high-humidity rated, of tempered extruded, anodized nickel-aluminum (6063-T6), with 10-year minimum warranty. Dependent upon opening requirements, threshold shall also be fire rated to positive or negative pressure conditions (UL10C or UL10B, respectively) and/or meet UL1784 for smoke testing. Air infiltration tested (per ASTM E-283) is preferred if available; sound tested (per ASTM E90) may be desirable dependent upon application. Bronze/brass CDA alloy C38500 acceptable with University approval for specific installation; case-by-case basis)

### Door Hardware - Weatherization
- Door gasketing/weatherstripping shall be required for each exterior door. Weatherstripping products shall be commercial grade, heavy-duty type, of extruded tempered aluminum (6063-T6) with thermo-plastic elastomer seal, mechanically fastened with stainless steel tuck screws. Weatherstripping and gasketing shall be installed in continuous fashion along the full edge of the door (multiple pieces or patching of product per side not acceptable). 3-year minimum warranty required.

### Handrails
- Handrails shall be stainless steel (316L) smooth surface round pipe of diameter meeting current code, including ADA requirements (i.e., 1.5" outside diameter and be attached with stainless steel screws (horizontal connections) and/or stainless steel anchors (base to wood, existing concrete, etc.) and/or fully grouted into stainless steel sleeves embedded in new concrete.

### Stair Appurtenances (nosings, etc.)
- Exterior/ exposed stair appurtenances, including nosings, contrast strips, and similar, shall be stainless steel (316) with slip-resistant surface (per ASTM/ANSI standards and/or UL 410) and be installed with concealed fasteners or techniques (i.e., stud welds at underside, embedded in concrete).

### AHU Door Hinges
- All door hinges for outdoor units shall be 316 or 316L stainless steel construction.

### AHU Interior Liners
- Interior liners shall be 316 or 316L stainless steel construction

### AHU Filter Frames
- Filter frames and coil frames shall be stainless steel 316L or 316L construction.

### AHU Flooring
- Flooring shall be either stainless steel or aluminum plate construction.
<table>
<thead>
<tr>
<th>Category</th>
<th>Subcategory</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>Mechanical/HVAC</td>
<td>AHU Exterior casing</td>
<td>Exterior casing surfaces for outdoor air handling or air conditioning units: All exposed and accessible exterior metal surfaces shall be protected with a water-reducible acrylic with stainless steel pigment spray-applied over the manufacturer’s standard finish. The spray coating thickness shall be 2-4 mils and provide minimum salt-spray resistance of 2,000 hours (ASTM B117) tested at 95°F and 95% relative humidity as per ASTM B-117. The base frame shall be completely coated with 2 to 4 mils of corrosion resistant phenolic primer after fabrication and welding.</td>
</tr>
<tr>
<td>Mechanical/HVAC</td>
<td>AHU Chilled Water and DX Cooling Coils</td>
<td>Chilled water or DX cooling coils shall be protected by ElectroFin E-coat, or other approved coatings. The coating shall be a water based, flexible polymer coating, 0.6 to 1.2 mils, 2H pencil hardness minimum, with less than 1% thermal derating.</td>
</tr>
<tr>
<td>Mechanical/HVAC</td>
<td>AHU Counter Flashings</td>
<td>Counter flashings for roof curb shall be minimum 26 gauge 304 stainless steel construction.</td>
</tr>
<tr>
<td>Mechanical/HVAC</td>
<td>AHU Electrical and Control Cabinets</td>
<td>All outdoor exposed electrical and control cabinets mounted on the units shall be NEMA 4X construction.</td>
</tr>
</tbody>
</table>
| Mechanical/HVAC             | Outdoor Exposed Ductwork and Equipment | 1. Insulated ductwork shall be protected by 0.016” thick aluminum jacket with a embossed finishes. Joining shall be longitudinal slip joints with 2” inch laps with 3/8” inch wide 0.015” thick aluminum metal bands 18” on center. Sheet metal screws are not acceptable.  
2. Field applied vapor barrier jackets shall be provided, in addition to the specified facings and jackets, on all exterior piping and ductwork. The vapor barrier jacket shall consist of a multi-layer laminated cladding with a maximum water vapor permeance of 0.001 perms. The minimum puncture resistance shall be 80 inch-pounds for exterior or exposed locations or where the insulation is subject to damage. |
| Plumbing                    | Outdoor Exposed Piping             | Aluminum Jacket-Piping systems. ASTM B209, 3003 alloy, H-14 temper, 0.6 mm (0.023 inch) minimum thickness with locking longitudinal joints. Joints for elbows, tees and other fittings shall be factory-fabricated to match shape of fitting and of 0.6 mm (0.024 inch) minimum thickness aluminum. Fittings shall be of same construction as straight run jackets but need not be of the same alloy. Factory-fabricated stainless steel or aluminum bands shall be installed on all circumferential joints. Bands shall be 0.5 inch on 18 inch centers. System shall be weatherproof. |
| Plumbing                    | Outdoor Natural Gas Pipe           | Galvanized steel pipe shall be used for outdoor natural gas piping. If back steel is used then specialty anti-corrosion coating shall be applied to the exterior of piping. |
| Electrical                  | Control Cabinets, Power Cabinets, Motors Starters, and VFDs | Exposed controls and power cabinets, including motor starters and variable frequency drives, shall be furnished with NEMA 4X enclosures.                                                                 |
| Electrical                  | Motors                             | Motors shall be Total Enclosed Fan Cooled (TEFC) type.                                                                                                                                                     |
| Electrical                  | Electrical and Low Voltage Conduits | For exposed to weather installation, electrical or low voltage conduits shall be galvanized rigid steel or rigid aluminum.                                                                                 |
| Electrical                  | Underground Installations          | For underground installation at saturated bay mud areas, all conduit shall be PVC coated rigid steel, or schedule 80 PVC with concrete encasement.                                                        |
| Electrical                  | Outdoor Electrical equipments; Including Switchboards, Transformers, Disconnect Switches, Motor starters, Variable Frequency Drives, and Pull Boxes | 1. NEMA 4X enclosures.  
2. All exposed and accessible non-stainless steel exterior metal surfaces shall be protected with a water-reducible acrylic with stainless steel pigment spray-applied over the manufacturer’s standard finish. The spray coating thickness shall be 2-4 mils and provide minimum salt-spray resistance of 2,000 hours (ASTM B117) tested at 95°F and 95% relative humidity as per ASTM B-117. |
| Electrical                  | Outdoor Emergency Generators       | Generator enclosure shall be all-weather aluminum construction, or rigid steel with corrosive resistance painted finish.                                                                                       |
| Electrical                  | Outdoor Lighting Fixtures          | Outdoor light fixtures shall be specifically constructed for wet and corrosive marine environments. The fixture shall be constructed with polyester housing reinforced with glass fiber, gasketed, sealed with impact resistant acrylic diffusers. Corrosion resistant plastic or stainless steel latches shall be used for securing the lamps. All nuts, bolts, and fasteners used on the fixture shall be corrosion resistant. |

Notes:

1. This Guideline Applies for Any Exposed Item to Outdoor Weather or Indirect Contact with the Outdoors