

5 Metals

NOTE: Significant revisions or additions to the previous standards are highlighted in italics.

GENERAL

Designers shall verify that all applicable portions of these standards are incorporated into the project's design, drawings, specifications and final construction. Requests for variances from these standards shall be submitted in writing to the FPD Project Manager, using the KU Standards Variance Request Form found in [Appendix A1.1](#), for review and written approval or rejection as indicated on the form.

RELATED DOCUMENTS & REQUIREMENTS

Refer to the following for requirements that also apply to work of this section.

- ☐ Division 1 - General Requirements; refer to sections regarding construction testing and field quality control requirements.
 - ☐ Quality Control Testing: Unless directed otherwise, the Owner shall separately contract for quality control testing during construction, not the Contractor.
- ☐ Appendix A1.7 – Accessibility: related requirements for stairs, ramps
- ☐ , and handrails.
- ☐ Division 7 - Thermal & Moisture Protection: Includes metal roofing.
- ☐ Division 8 - Openings: Includes roof hatches, door and window frames.
- ☐ Division 9 - Finishes: Includes KU's standard bronze paint specification and design mix.
- ☐ Division 32 – Exterior Improvements: Contains additional information about ramps, walks, and site improvements that may be related to work of this section.

MATERIALS AND FINISHES – DESIGN GUIDELINES

General: Designers shall select, specify and detail metal materials, finishes and systems that are appropriate for each application, of heavy-duty construction, and which will result in highly durable, low maintenance, watertight construction.

- ☐ All exterior metal shall either be of non-corrosive materials, such as aluminum, stainless steel or copper, or if steel/ferrous metals are used, they shall be protected with hot-dip galvanized coatings and when appropriate, painted finishes.
 - ☐ *Handrails and guardrails shall be stainless steel and shall not be painted unless requested by FPD.*

FASTENERS – DESIGN GUIDELINES

General: Designers shall be responsible for determining the appropriate fasteners to be used for each type of connection and material, taking into account structural requirements such as dead and live loads, atmospheric exposures, code requirements and durability needs. Each required fastener shall be indicated in the drawings or specified, with the following information included.

- ☐ Material (steel, stainless steel, high-strength steel, etc.)
- ☐ Finish, if applicable (hot-dip galvanized, pre-finished paint to match substrate material)
- ☐ Diameter (1/4", 3/8", etc.)
- ☐ Length &/or Embedment, if applicable (EX: depth of embedment for expansion anchors determines load bearing capacity & is to be specified by designers.)
- ☐ Head or Type, if applicable (truss bolt, panhead, sheet metal screw, gasketed, carriage bolt)
- ☐ On-Center Spacing (EX: UL Standard I-28 stipulates specific o.c. spacings for fasteners in roof edge nailers in order to meet certain wind uplift criteria; as well as other criteria such as fastener diameters; designers are to stipulate fastener spacings.)

Nailers, Blocking & Miscellaneous Roofing System Members: Designers shall pay particular attention to the designation of fasteners for members to which roofing membranes, flashings, roof edges and copings are attached.

- ☐ Designers shall verify manufacturer's fastener requirements in order to meet specified wind uplift or fire rating requirements, and indicate the specific fasteners accordingly.

METAL RAILINGS – DESIGN GUIDELINES

Exterior Guardrails: *Refer to Div. 32 - Exterior Improvements for related standards and standard details.*

Stair Handrails:

- ☐ All handrails, interior and exterior, shall be round *stainless steel* and 1-1/4" nominal pipe (1-5/8" actual outside diameter) or as otherwise approved by FPD.
- ☐ Exterior handrails shall be one bent pipe, continuous from the posts at the top and bottom of the stair run, with radiused joints. Refer to Div. 32 - Exterior Improvements for related standards and standard details.
 - ☐ Intermediate vertical posts shall be provided at roughly 6' o.c. maximum for stair railings longer than 6' overall; evenly spaced along railing.
 - ☐ A second sloped handrail shall be provided at the mid-height for stairs in public venue areas that may frequently have young children using them.
- ☐ All wall-mounted handrails shall be detailed to return to walls, and shall be noted to have fully-welded and ground smooth closed ends.

Mounting Method:

- ☐ *Bolt to concrete - Designers shall pay special attention to railing details to avoid edge "breakout" or spalling conditions. No railing shall extend closer than 2" clear to the edge of concrete structure edges.*

Expansion: Metal handrails and guardrails shall be sectioned to provide for expansion and contraction, with appropriate slip joints that maintain railings in alignment.

Interior Egress Control or Exit Stop Gates: Provide heavy-duty gates, fabricated from welded steel or aluminum tubes, at top of “down” stairs to prevent pedestrian travel past a required exit.

- ☐ Exit stop gates shall not be secured directly to walls, since expansion-anchored, individual hinge screws have proven easy to pull out of walls.
- ☐ It is recommended to attach to walls with either a continuous hinge with multiple anchors, or a steel support post anchored to wall, with hinges welded to it.
- ☐ Provide with spring hinges to keep closed, and magnetic hold-opens tied into fire alarm system when gates are to be held open during normal operation.

METAL PAN STAIRS – DESIGN GUIDELINES

Risers: Steel-framed stairways shall have closed metal pan risers.

Alternating Tread Stairs: Designers may use these stairs for maintenance access to roofs or mechanical equipment rooms and mezzanines, but they may not be used as a second exit or in lieu of code-required stairs.

ARCHITECTURALLY EXPOSED STRUCTURAL STEEL FRAMING – 051213

General: Project Designers shall clearly indicate those structural steel elements that are to be designated as “architectural” elements, and which will be expected to have a higher level of fit and finish than standard structural steel components. The architectural tolerances and expectations shall be clearly outlined, but shall also be reasonable and achievable without great expense or difficulty.

METAL FABRICATIONS – 055000

Ladders: Custom shop-built ladders shall not use narrow profile or plate treads or side rails, which are uncomfortable to grasp when climbing. Rungs shall be not less than 1" diameter (#8 rebar is one acceptable option).

PIPE AND TUBE RAILINGS – 055213

Materials: *Guardrails and handrails should be fabricated from structurally durable and maintainable materials.*

Fabrication: All railings shall have mitered and fully welded joints, filled with epoxy body putty and ground smooth as required to create smooth joint transitions.

- ☐ Mechanical connections should be carefully considered. Side-mounted, friction-kept, or Allen-screw-mounted mechanical connections of stair rail systems have not proven to be durable, and are not recommended.

Wall Brackets: All wall-mounted handrail brackets shall have concealed fasteners to wall substrates.

Finishes:

- ☐ Interior railings shall be fully painted or fabricated from aluminum or stainless steel components.
- ☐ *Refer to Div. 32 - Exterior Improvements for related exterior railing standards*