SECTION 05 73 13
GLAZED DECORATIVE METAL RAILINGS / GLASS RAILINGS
2-LINE CHESTERFIELD GLASS RAILING, POST-SUPPORTED GLASS RAILING
+ POINT-MOUNTED GLASS RAILING

PART 1 GENERAL

1.1 SUMMARY

A. Furnish and install pre-engineered welded decorative aluminum railings. Railings include:
   1. Railings with glass infill panels (Chesterfield).

1.2 REFERENCES

A. Aluminum Association (AA):
   1. AA ASDI: Aluminum Standards and Data US.

B. American Architectural Manufacturers Association (AAMA):
   1. AAMA 2603: Voluntary Specifications, Performance Requirements and Test Procedures for Pigmented Organic Coatings on Aluminum Extrusions and Panels.
   2. AAMA 2604: Voluntary Specifications, Performance Requirements and Test Procedures for High Performance Organic Coatings on Aluminum Extrusions and Panels.
   3. AAMA 2605: Voluntary Specifications, Performance Requirements and Test Procedures for Superior Performing Organic Coatings on Aluminum Extrusions and Panels.

C. Americans with Disabilities Act (ADA):
   1. Standards for Accessible Design, 2010

D. American National Standards Institute (ANSI):
   1. A117.1 Accessible and Usable Buildings and Facilities.
   2. A1264.1: Workplace Walking/Working Surfaces and their Access; Workplace, Floor, Wall and Roof Openings; Stairs and Guardrail Systems.
   3. Z97.1 Safety Glazing Materials Used in Buildings - Safety Performance Specifications and Methods of Test.

E. American Society of Civil Engineers (ASCE)
   1. Minimum Design Loads for Buildings and Other Structures

F. American Society for Testing and Materials (ASTM):
   1. B209: Standard Specification for Aluminum and Aluminum-Alloy Sheet and Plate.
   2. B221: Standard Specification for Aluminum and Aluminum-Alloy Extruded Bars, Rods, Wire, Profiles, and Tubes.
   3. B429/B429M: Standard Specification for Aluminum-Alloy Extruded Structural Pipe and Tube.
   4. C1048: Standard Specification for Heat-Strengthened and Fully Tempered Flat Glass.
   5. C1172-09: Standard Specification for Laminated Architectural Flat Glass.

6. E894: Standard Test Methods for Anchorage of Permanent Metal Railing Systems and Rails for Buildings.
7. E935: Standard Test Methods for Performance of Permanent Metal Railing Systems and Rails for Buildings.
8. E2353: Standard Test Methods for the Performance of Glass in Permanent Glass Railing Systems, Guards and Balustrades.
9. E2358: Standard Specification for the Performance of Glass in Permanent Glass Railing Systems, Guards and Balustrades.
10. F593: Standard Specification for Stainless Steel Bolts, Hex Cap Screws, and Studs.
11. F594: Standard Specification for Stainless Steel Nuts.

G. American Welding Society (AWS):
1. B5.17 Specification for the Qualification of Welding Fabricators.
2. D1.2/D1.2M: Structural Welding Code - Aluminum.
3. QC 17: Specification for AWS Accreditation of Certified Welding Fabricators.

H. International Code Conference (ICC):
1. International Building Code (IBC)
2. Accessible and Usable Buildings & Facilities

I. National Ornamental & Miscellaneous Metals Association (NOMMA):
1. Joint Finish Guidelines

J. National Association of Architectural Metal Manufacturers (NAAMM):
1. Metal Finishes Manual
2. Pipe Railing Systems Manual
3. Stair Manual

K. Applicable State or Local Building Code

L. United States Consumer Product Safety Commission (CPSC)
1. 16 CFR Part 1201: Safety Standard for Architectural Glazing Materials
2. Safety Barrier Guidelines for Residential Pools

M. IBC-APSP International Swimming Pool and Spa Code (ISPSC)

1.3 PERFORMANCE REQUIREMENTS

A. Engineer, fabricate and install handrails and railing systems to withstand the following structural loads without exceeding the allowable design working stress of the materials for the handrails, railing systems, anchors and connections:
1. Top Rail of Guards:
a. Concentrated load of 200 lbf (0.89kN) applied at any point and in any direction
b. Uniform load of 50 lbf-ft. (0.07kN-m) applied in any direction
c. Concentrated and uniform loads above need not be assumed to act concurrently.
2. Handrails Not Serving as Top Rails:
a. Concentrated load of 200 lbf (0.89kN) applied at any point and in any direction
b. Uniform load of 50 lbf-ft. (0.07kN-m) applied in any direction
c. Concentrated and uniform loads above need not be assumed to act concurrently.
3. Guards Infill Area:
a. Concentrated horizontal load of 50 lbf (089kN) applied to a 1sq. ft. at any point in system, including panels, intermediate rails, balusters, or other elements composing infill area.
b. Loads need not be assumed to act concurrently, with loads on top rails in determining stress on guard.

B. Design handrails and railing systems to protect occupants at open-sided floor areas, pedestrian guidance and support, visual separation and wall protection.

C. Thermal Movements: Design handrails and railings to allow for movements resulting from 120 degree F (49 C) changes in ambient and 180 degree F (82 C) surface temperatures. Base engineering calculation on surface temperatures of materials due to both solar heat gain and nighttime-sky heat loss.

D. Corrosion Resistance: Separate incompatible materials to prevent galvanic corrosion.

1.4 SUBMITTALS

A. Product Data:
   1. Manufacturer's technical product data.
   2. Anchorage and paint product data.

B. Color Samples: Paint color verification samples from manufacturer's standard color palate.

C. Welding Certification: Manufacturer certification based on AWS B5.17 and AWS QC 17.

D. Test Reports: Structural performance evaluation of railing system in accordance with the following criteria:
   1. ICC-ES AC273 (Most Current Version), Acceptance Criteria for Handrails and Guards
   2. ICC-ES AC273-8 as acceptance criteria for the following building codes:
      a. 2015 International Building Code, International Code Council
      b. 2015 International Residential Code, International Code Council

E. Shop Drawings to Contain the Following:
   1. Fabrication and installation details of handrail and railings, include fully dimensioned plans, elevations, sections, details of connection, related components, fasteners, anchors, expansion provisions and finishes. Indicate member sizes, shapes, wall thickness of hollow members and post spacings.
   2. Attachment details to the building structure including anchorage locations and depths of anchorage.
   3. Drawings and structural calculations containing a signature and seal of a professional engineer licensed in the state where the project is located.

1.5 QUALITY ASSURANCE

A. Single Source Responsibility: Obtain railing systems of each type and material from a single manufacturer with a minimum of twenty (20) years of experience and able to provide letter of bondability.

B. Mockup: Provide a mockup to verify selections, demonstrate aesthetic effects, anchorage, and to set quality standards for fabrication and installation.
   1. Mockup to be set in area designated by Architect
   2. Do not proceed with remaining work until workmanship, color and sheen are approved by Architect.
   3. Mockup may remain in place and become incorporated into the finished work, subject to:
      a. Approval of Manufacturer.
      b. Approval of Architect.

C. Performance of Work in Accordance with ASTM E985.

D. Welding Standard: Welding operators and procedures, and robotic welding and procedures to comply with AWS D1.2/1.2M.

E. Safety Requirements, General: Comply with ANSI/ASSE A1264.1.

F. Safety Glazing; Comply with CPSC 16 CFR Part 1201, Category II and ANSI Z97.1, Class A impact resistance requirements. Provide permanent certification label on each glass lite attesting compliance and acceptable to authorities having jurisdiction.

1.6 COORDINATION, SCHEDULING AND PROJECT CONDITIONS

A. Anchorage Locations: Approved coordination and setting drawings to be provided in time to avoid and address any conflicts with post-tension cables, proximity to edge and other slab conditions.

B. Embedments and Templates: The option for templates and directions for installing anchorages should be made available, including sleeves, concrete inserts, anchor bolts and items with integral anchors, that are to be embedded in concrete or masonry or prior to installation of roofing, weatherproofing or decking. Deliver items to Project Site in time for installation.

C. Field Measurement:
1. Where handrails and railings are indicated to fit to other construction, check actual dimensions of other construction by accurate field measurements including pitch of anchorage before fabrication; show recorded measurements on final shop drawings.
2. Where field measurements cannot be made without delaying the railing fabrication and delivery, obtain confirmation in writing by the contractor or architect and to proceed with fabrication of products so as not to delay fabrication, delivery and installation based on final shop drawings showing guaranteed dimensions.
3. Coordinate surrounding work to hold to railing tolerances whenever practicable to ensure adequate anchorage availability, eliminate gaps between railings, function of surrounding doors, windows, outlets, spigots and other surrounding work, allow for continuity of visual site-lines and avoid delays.

D. Storage: Store railings away from uncured concrete and masonry and protected from weather, moisture, soiling, abrasion, extreme temperatures and humidity.

E. Field Conditions: Ensure all substructure is clean, flat and appropriate for anchorage prior to installation.

PART 2 PRODUCTS

2.1 MANUFACTURERS

A. Acceptable Manufacturer: Kane Innovations, Inc. | Address: 2250 Powell Avenue, Erie, PA 16506 | Phone: 800.773.2439 | Website: www.kaneinnovations.com | Email: help@kaneinnovations.com

2.2 METALS

A. General: Provide metal free from surface blemishes where exposed to view in the finished unit. Exposed-to-view surfaces exhibiting pitting, seam marks, roller marks, stains discolorations or other imperfections on finished units are not acceptable.

B. Aluminum: Provide alloy and temper recommended by aluminum producer or finisher for type of use and finish indicated, and with not less than the strength and durability properties of the alloy and temper designated below for each aluminum form required
1. Extruded Bar and Shapes: ASTM B 221 (ASTM B 221 M), alloy 6063-T5/T52 6063-T6, 6061-T6, 6005-T5
2. Extruded Pipe and Tube: ASTM B429, alloy 6063-T6, 6061-T6, 6005-T5 or better
3. Plate and Sheet: ASTM B 209 (ASTM B 209M), alloy 6063-T5/T52, 6061-T6, 6005-T5

or better
4. Stamped Die and Hand Forgings: ASTM B 247 (ASTM B 247M)
5. No Castings permitted. Others cite ASTM B 26/B 26M

2.3 GLASS INFILL PANELS

A. Tempered Glass Panels. Provide tempered glass panels to be provided complying with ASTM C1048, CPSC 16 CFR 1201 and ANSI Z97.1, class, thickness, and manufacturing process as indicated below:
1. Glass: Glass to be selected by the Architect.
2. Nominal Thickness: As required to support structural loads.

B. Tempered Laminated Glass Panels: Provide laminated safety glass complying with ASTM C1172, ASTM C 1048, Kind FT (fully tempered), Condition A (uncoated), Type 1 (transparent glass, flat), Quality q3 (glazing select), class, thickness, and manufacturing process as indicated below:
1. Glass: Glass to be selected by the Architect.
2. Nominal Thickness: As required to support structural loads.
3. Laminated Glass: Comply with ASTM C 1172 for kinds of laminated glass indicated and other requirements specified.
4. Interlayer: Interlayer material as indicated below, clear or in colors, and of thickness indicated with a proven record of no tendency to bubble, discolor, or lose physical and mechanical properties after laminating glass lites and installation.
a. Interlayer Material: SentryGlas Interlayer as manufactured by DuPont.
5. Laminating Process: Fabricate laminated glass complying with ASTM C1172 free of foreign substances and air or glass pockets.

C. Set on neoprene setting blocks with 70 Duro Black EPDM UV-rated gaskets.

2.4 FASTENERS

A. Fasteners for Anchoring Railings to Other Construction: Select fasteners of the type, grade, and class required to produce connections that are suitable for anchoring railing to other types of construction indicated and capable of withstanding design loadings and as directed by the professional calculations.

B. Fasteners for Interconnecting Railing Components: Use fasteners of same basic metal as the fastened metal, unless otherwise indicated. Do not use metals that are corrosive or incompatible with materials joined.
1. Provide brackets with flange for concealed anchorage to hanger bolt.
2. Provide formed brackets with predrilled hole for exposed bolt anchorage.
3. Provide brackets with internal sleeve connectors.
4. Provide fasteners that are aluminum or (300-series) stainless steel.

2.5 MISCELLANEOUS METALS

A. Corrosion Protection: Powder coat concealed surfaces of aluminum that will come into contact with grout, concrete, masonry, wood, or dissimilar metal with:
1. Polyester powder coating finish.
2. Neoprene or Korolath Isolation pad/gasket.
3. Bituminous paint.

2.6 GROUT AND ANCHORING CEMENT

A. Non-shrink, Nonmetallic Grout: Premixed, factory-packaged, non-staining, non-corrosive, non-gaseous grout complying with ASTM C 1107. Provide grout specifically recommended by manufacturer for interior and exterior applications. Product to be used:

1. Dayton Superior Anchor All Anchoring Cement

2.7 FABRICATION

A. General: Fabricate handrails and railing systems in configurations indicated on Drawings and according to approved shop drawings.

B. Structural: Comply with requirements indicated for design, dimensions, details, finish, and member sizes, including wall thickness of hollow members, post spacings, and anchorage, but not less than that required to support structural loads.

C. Welding: In order to ensure maximum assurance of strength for useful life of railing:
1. Weld all posts to top rail and lower horizontal members.
2. Weld mitered corners.
3. Weld flat caps to otherwise expose ends of top and bottom rails.
4. Welding to be done in a factory environment.
5. Use materials and methods that minimize distortion and develop strength and corrosion resistance of base metals.
6. Obtain fusion without undercut or overlap.
7. Remove welding flux immediately.
8. At exposed connections, finish exposed welds to a NOMMA #3 finish.

D. Splicing: Assemble railing systems in shop to the greatest extent possible to minimize field splicing and assembly. Disassemble units only as necessary for shipping and handling limitations.
1. Clearly mark units for reassembly and coordinated installation. Use connections that maintain structural value of joined pieces.
2. Fabricate railing systems and handrails by connecting members with railing manufacturer's standard concealed mechanical fasteners and fittings, unless otherwise indicated.
3. Cut, reinforce, drill, and tap components, as indicated, to receive finish hardware, screws, and similar items.

E. Finishing:
1. Fabricate railings square, plumb, straight and true with all joints neatly and accurately aligned and fastened.
2. Remove burrs from cut sections.
3. Punched and drilled holes to be clean, accurately spaced without deformation to components.
4. Fabricate members and fittings to produce flush, smooth, rigid, hairline joints.
5. Shear and punch metals cleanly and accurately. Remove burrs from exposed cut edges.
6. Ease exposed edges to a radius of approximately 1/32 inch (1 mm), unless otherwise indicated. Form bent-metal corners to the smallest radius possible without causing grain separation or otherwise impairing work.

F. Weep Holes: Provide weep holes or other acceptable means to allow condensation to exit from hollow sections of railing members.

G. Base-plates:
1. Weld all baseplates to required structural loading. All baseplates to be factory welded to posts using a NOMMA #3 finish.
2. Baseplate 6061-T6 alloy.

H. Fillers: Provide steel sheet or plate fillers of thickness and size indicated or required to support structural loads of handrails where needed to transfer wall bracket loads through wall finishes to structural supports. Size fillers to suit wall finish thicknesses. Size fillers to

produce adequate bearing to prevent bracket rotation and overstressing of substrate.

I. Anchors: Professionally engineered anchors to connect guardrails/handrails and railing components to the substrate. Dissimilar metals should be isolated.

J. Glass Panels:
1. Fabricate glass panels to provide for proper edge clearance and bite on glass.
2. Ensure all glass edges are square, trimmed of any excess lamination.
3. Polishing of any tempered or laminated glass after manufacturing process is not allowed.

2.8 PAINTED FINISHES

A. Corrosion is a long term risk to railings that must be minimized. Finishing to be done following fabrication in a controlled environment to entire railing system to ensure coating of:
1. Mechanically joined pieces.
2. Factory cut ends.
3. All welds, seams and joinery.

B. Finish designations prefixed by AA conform to the system established by the Aluminum Association for designating aluminum finishes. Finish shall be designated as one of the following
(NOTE TO SPECIFER: PLEASE SELECT ONE OF THE FINISHES BELOW)
1. AAMA 2605: High Performance Organic Coating Finish: AAC12C42R1X (Chemical Finish: cleaned with inhibited chemicals; Chemical Finish: acid chromate fluoridephosphate conversion coating; Powder Coating: as specified below). Prepare, pretreat, and apply coating to exposed metal surfaces to comply with manufacturer's written instructions A minimum 5 stage cleaning and pre-treatment system shall be utilized to remove organic and inorganic surface oils, residual oxides, and apply a chrome containing conversion coating, weights should be a minimum of 431 mg/m2 (40 mg/fF). The pre-treatment when used in conjunction with a baked organic coating shall produce a total finishing system capable of meeting impact, adhesion, detergent, humidity and salt spray performance as specified in the appropriate AAMA 2605 specification
2. AAMA 2604: Polyester Powder Coating, 2-3 mil. Average film thickness complying with AAMA 2604.

C. Color: As selected by architect from manufacturer's standard color palette.

D. Protection: Protect mechanical finishes on exposed surfaces from damage by applying a strippable, temporary protective covering prior to shipment.

E. Appearance of Finished Work: Variations in appearance of abutting or adjacent pieces are acceptable if they are within one half of the range of approved samples. Noticeable variations in the same piece are not acceptable. Variations in appearance of other components are acceptable if they are within the range of approved samples and they are assembled or installed to minimize contrast.

PART 3 EXECUTION

3.1 PREPARATION

A. Anchorages: Coordinate setting drawings, diagrams, templates, instructions, and directions for installing anchorages, such as sleeves, inserts, anchor bolts, and miscellaneous items having integral anchors that are to be embedded in substrate. Coordinate delivery of such items to Project site.

B. Examination: Closely examine substrates and compare to post locations, conditions of substrate such as slope and required wood blocking are as set forth on approved shop-drawings.

C. Notify General Contractor, Architect and/or Engineer of Record and do not proceed with installation if discrepancies exist.

3.2 ANCHORING POSTS INSTALLATION

A. Anchor posts to substrate in accordance with manufacturer's instructions.

B. Do not obstruct weep holes at bottom of post.

C. At embedded post conditions, leave anchorage grout exposed and sloped away from post.

3.3 RAILING INSTALLATION

A. Shop Drawings: Install aluminum railings in accordance with approved shop drawings and manufacturer's written instructions.

B. Fastening to In-Place Construction: Use anchorage devices and fasteners where necessary for securing handrails and railings systems and for properly transferring loads to in-place construction.

C. Spacing: Fit exposed connections accurately together to form joints as set in approved shop drawings.

D. Splice Tolerances: Railing system should allow hairline to 1/8" tolerances at splice locations. Tolerances for railing expansion joints should be 1/8" to 1/4" to allow for movement of railing system.

E. Field Modification: Do not weld, cut, or abrade surfaces of handrails and railing components that have been coated or finished after fabrication.

F. Corrosion Protection: Ensure all spacers, bituminous paint and other protection is in place to avoid aluminum contact with grout, concrete, masonry, wood, or dissimilar metals.

3.4 INSTALLING GLASS PANELS

A. Insert Neoprene setting blocks in railing glazing channel, if applicable.

B. Install glass

C. Neatly cut and fit glazing around glass in setting channel, if applicable. Where no setting channel exists, ensure glass is secured with appropriate mounting hardware.

D. Ensure glass is level, in compliance with railing manufacturer's instruction and listed tolerances.

E. Provide expansion provisions recommended by railing manufacturer.

3.5 PROTECTION

A. Protect finishes of railing systems and handrails from damage during construction period with temporary protective coverings approved by railing manufacturer. Remove protective coverings at the time of Substantial Completion.

B. Restore finishes damaged during installation and construction period, subject to Architect's approval, using manufacturer's recommended restorative procedures and materials or return

damaged railing components to the manufacturer for refinishing or replacement.

C. Clean Aluminum and Glass Surfaces as recommended in writing by the manufacturer.

3.6 INSPECTION AND MAINTENANCE

A. Follow inspection schedule as recommended in writing by the manufacturer:
   1. Immediately upon completion.
   2. One year following substantial completion.
   3. Every five years by a licensed, professional engineer.

B. Perform maintenance as necessary to ensure railings fulfill their life safety requirements.

END OF SECTION 05 73 13