



SECTION 05 73 00

STAINLESS STEEL WIRE ROPE RAILING SYSTEMS

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PART 1 GENERAL

1.1 SECTION INCLUDES

- A. Horizontal wire rope railing infill system.
- B. Vertical wire rope railing infill system.
- C. Vertical stainless steel rods.
- D. Stainless steel netting.

1.2 RELATED SECTIONS

- A. Section 03 30 00 - Cast-in-Place Concrete.
- B. Section 04 40 00 - Stone Assemblies.
- C. Section 05 50 00 - Metal Fabrications.
- D. Section 05 51 33 - Metal Ladders.
- E. Section 05 52 17 - Roof Fall Protection.
- F. Section 06 20 00 - Finish Carpentry.
- G. Section 06 43 13 - Wood Stairs.

1.3 REFERENCES

- A. American Iron and Steel Institute (AISI) - Steel Product Manual; Stainless and Heat Resisting Steel.
- B. ASTM A 276 - Stainless and Heat-Resisting Steel Bars and Shapes.
- C. ASTM A 380 - Practice for Cleaning and Descaling Stainless Steel Parts, Equipment and Systems.
- D. ASTM A 492 - Specification for Stainless Steel Rope Wire.
- E. ASTM A 555 - Stainless Steel Wire.
- F. ASTM A 582 - Specification for Free-Machining Stainless and Heat-Resisting Steel Bars.
- G. ASTM B 912 - Specification for Passivation of Stainless Steels Using

Electropolishing.

- H. ASTM E 935 - Permanent Metal Railing Systems and Rails for Buildings.
- I. ASTM E 985 - Anchorage of Permanent Metal Railing Systems and Rails for Buildings.
- J. ASTM F 1145 - Specification for Turnbuckles, Swaged, Welded, Forged.
- K. MIL-C-5688 - Pre-Stretching and Proof-Testing of Wire Rope Assemblies.

1.4 DESIGN / PERFORMANCE REQUIREMENTS

- A. Structural Requirements: Provide wire rope railings systems capable of withstanding the effects of gravity loads and the following loads and stresses within limits and under conditions indicated on the Drawings:
 - 1. Handrails:
 - a. Uniform load of 50 lbs/ft. (0.73 kN/m) applied in any direction.
 - b. Concentrated load of 200 lbs/ft (0.89 kN) applied in any direction.
 - c. Uniform and concentrated loads need not be assumed to act concurrently.
 - 2. Top Rails of Guards:
 - a. 50 lbs/ft. (0.73 kN/m) applied horizontally and concurrently with 100 lbs/ft. (1.46 kN/m) applied vertically downward.
 - b. Concentrated load of 200 lbs/ft (0.89 kN) applied in any direction.
 - c. Uniform and concentrated loads need not be assumed to act concurrently.
 - 3. Infill of Guards:
 - a. Concentrated load of 200 lbs/ft (0.89 kN) applied horizontally on an area of 1 SF (0.093 sm).
 - 4. Railing shall comply with all requirements of the ADA and OSHA regulations.
- B. Wire rope railing systems shall be designed, fabricated, and installed to comply with applicable codes and regulations.
 - 1. Minimum guardrail height: 42 inches (1067 mm).
 - 2. Maximum opening in guardrail: Shall restrict 4 inches (102 mm) diameter sphere.
 - 3. Handrail diameter: 1-1/4 inches (32 mm) minimum and 2 inches (51 mm) maximum.
 - 4. Handrail clearance from wall: 1-1/2 inches (38 mm) minimum.
- C. Wire rope railing systems shall be designed, fabricated, and installed to accommodate expansion and contraction of metal components without causing undue stress, buckling, opening of joints, and distortion.
- D. Design supports and hardware to withstand loads encountered without excessive deflection or distortion when cables are tensioned to required amounts required to conform to applicable building codes.
- E. Exposed fasteners shall be of same materials, color and finish as material to which applied. Exposed surfaces throughout project shall have same inherent texture and color for similar locations.

1.5 SUBMITTALS

- A. Submit under provisions of Section 01 30 00.
- B. Product Data: Provide manufacturer's standard catalog data for specified products

demonstrating compliance with referenced standards. Provide list of fittings being provided with descriptions, load capabilities, and either photographs or drawings for each type.

- C. Shop Drawings: Submit Shop Drawings for fabrication and installation. Include the following:
 - 1. Plans, elevations, and detail sections.
 - 2. Indicate materials, methods, finishes, fittings, fasteners, anchorages, and accessory items.
 - 3. Provide setting diagrams and templates for anchorages, sleeves, and bolts to be installed by others.
 - 4. Where materials or fabrications are indicated to comply with design loadings, include material and safety factor properties, and other information needed for structural analysis.
- D. Verification Samples: Two samples representing actual products and finishes as follows:
 - 1. Wire rope with fitting, minimum size 12 inches (300 mm) long.
 - 2. Typical fittings.
- E. Installation Instructions: Manufacturer's printed installation instructions.
- F. Operation and Maintenance Data: Include methods for maintaining installed products and precautions against cleaning materials and methods detrimental to finishes and performance.
- G. Manufacturer's Certificates: Certify products meet or exceed specified requirements.

1.6 QUALITY ASSURANCE

- A. Manufacturer Qualifications: Company specializing in manufacturer of stainless steel wire rope, fittings, and other stainless steel components with 10 years minimum successful experience.
- B. Installer Qualifications: Experienced in performing work of this section that has specialized in installation of work similar to that required for this project.
- C. Mock-Up: Provide a mock-up for evaluation of preparation techniques and installation workmanship.
 - 1. Locate in areas designated by Architect.
 - 2. Size: Minimum of 8 LF (2.4 lm).
 - 3. Do not proceed with remaining work until workmanship is approved by Architect.
 - 4. Rework mock-up as required to produce acceptable work.
 - 5. Retain mock-up during construction as quality standard.
 - 6. Remove and legally dispose of mock-up when no longer needed.
 - 7. Incorporation: Incorporate mock-up into final construction.
- D. Preinstallation Meetings: Conduct meetings including Contractor, Architect, fabricator, installer and other subcontractors whose work involves cable railing system to verify project requirements, framing and support conditions, mounting surfaces and manufacturer's installation. Comply with Division 1 requirements.

1.7 DELIVERY, STORAGE, AND HANDLING

- A. Store products in manufacturer's unopened packaging until ready for installation.
- B. Handle and store products according to manufacturer's recommendations. Leave

products wrapped or otherwise protected and under clean and dry storage conditions until required for installation.

- C. Exercise care not to scratch, mark, dent, or bend metal components during delivery, storage, and installation.

1.8 PROJECT CONDITIONS

- A. Verify actual openings by field measurements before fabrication; show recorded measurements on shop drawings.
- B. Coordinate field measurements and fabrication schedule with construction progress to avoid construction delays.

PART 2 PRODUCTS

2.1 MANUFACTURERS

- A. Acceptable Manufacturer: Jakob Rope Systems, which is located at: 955 N. W. 17th Ave. Unit B ; Delray Beach, FL 33445; Toll Free Tel: 866-215-1421; Tel: 561-330-6502; Fax: 561-330-6508; Email: [request info \(info@jakob-usa.com\)](mailto:info@jakob-usa.com); Web: www.jakob-usa.com
- B. Substitutions: Not permitted.
- C. Requests for substitutions will be considered in accordance with provisions of Section 01 60 00.
- D. Provide all cable, materials, fittings and components from a single manufacturer.

2.2 WIRE ROPE

- A. Material: ASTM A 492 and ASTM A 555, Type 316 stainless steel. Fabricate wire rope with integral colored filament designating specific manufacturer.
- B. Type 1: ___ x ___ wire rope; INOX No. _____ as manufactured by Jakob, Inc.
 - 1. Diameter: _____ inches (_____ mm).
 - 2. Breaking load including safety factor: _____ pounds (_____ kg) minimum.
- C. Type 2: ___ x ___ wire rope; INOX No. _____ as manufactured by Jakob, Inc.
 - 1. Diameter: _____ inches (_____ mm).
 - 2. Breaking load including safety factor: _____ pounds (_____ kg) minimum.
- D. Type 3: ___ x ___ wire rope; INOX No. _____ as manufactured by Jakob, Inc.
 - 1. Diameter: _____ inches (_____ mm).
 - 2. Breaking load including safety factor: _____ pounds (_____ kg) minimum.
- E. Length: Provide wire rope tendons in lengths indicated on Drawings and approved shop drawings.
 - 1. Provide optimum adjustment in both directions by calculating final tendon lengths with allowance for tensioning fittings with 2/3 open and with 1/3 of thread length engaged.
 - 2. Measure tendon length from center of pin to center of pin, or center of eye to center of eye.

2.3 WIRE NETTING

- A. Material: Webnet as manufactured by Jakob, Inc. Parallel stainless steel wire ropes

connected by reciprocally curved offset sleeves or clamps such that ropes are neither knotted nor crossed. Wire rope shall be fabricated from cold-drawn, AISI Type 316 stainless steel wire complying with ASTM A 492 and ASTM A 555.

- B. Type 1: Webnet No. _____ as manufactured by Jakob, Inc.
 - 1. Diameter: _____ inches (_____ mm).
 - 2. Breaking load including safety factor: _____ pounds (_____ kg) minimum.
- C. Type 2: Webnet No. _____ as manufactured by Jakob, Inc.
 - 1. Diameter: _____ inches (_____ mm).
 - 2. Breaking load including safety factor: _____ pounds (_____ kg) minimum.
- D. Type 3: Webnet No. _____ as manufactured by Jakob, Inc.
 - 1. Diameter: _____ inches (_____ mm).
 - 2. Breaking load including safety factor: _____ pounds (_____ kg) minimum.
- E. Perimeter configurations:
 - 1. Perimeter Type No. _____ as manufactured by Jakob, Inc.
 - a. Open.
 - b. Closed with uncompressed sleeves.
 - c. Closed with eye ends.
 - d. Suitable for:
 - 1) Vertical installation.
 - 2) Horizontal installation.
 - 2. Perimeter Type No. _____ as manufactured by Jakob, Inc.
 - a. Open.
 - b. Closed with uncompressed sleeves.
 - c. Closed with eye ends.
 - d. Suitable for:
 - 1) Vertical installation.
 - 2) Horizontal installation.

2.4 STAINLESS STEEL RODS

- A. Rod spindles: Solid stainless steel rods, AISI Type 316 complying with ASTM A 276.
- B. Size:
 - 1. Diameter: 1/4 inch (6 mm).
 - 2. Diameter: 5/16 inch (8 mm).
 - 3. Diameter: 3/8 inch (10 mm).
 - 4. Diameter: 15/32 inch (12 mm).
 - 5. Diameter: 5/8 inch (16 mm).
 - 6. Diameter: 25/32 inch (20 mm).
 - 7. Diameter: 7/8 inch (22 mm).
 - 8. Diameter: 15/16 inch (24 mm).
 - 9. Lengths as indicated on the Drawings.
- C. Rod termination:
 - 1. External threads for on-site attachment.
 - 2. Swaged with end connector fittings.

2.5 FITTINGS

- A. Provide fittings required for attachment and connection of stainless steel wire rope and infill to support framework and substrates.

- B. Fitting minimum breaking strength:
 - 1. _____ percent of wire rope minimum breaking strength.
 - 2. As selected by manufacture to suit application and design requirements specified.

- C. Types: Fabricate from AISI Type 316 and 316L stainless steel complying with ASTM F 1145; INOX Line Fittings as manufactured by Jakob, Inc. Provide sizes and types as required to meet project design conditions specified and indicated on Drawings and reviewed shop drawings including:
 - 1. Shop applied swaged rope ends: Threaded external and internal swivel ends, turnbuckles, tensioning screws, end stops, clevis ends, eye ends, loop ends, and end cones.
 - 2. Screwed rope ends for on-site assembly: Threaded external and internal swivel ends, turnbuckles, tensioning screws, end stops, clevis ends, eye ends, loop ends, and end cones.
 - 3. Clamps: Ring clamps, cross clamps, wire rope clamping cones, and connecting wire rope clamps.
 - 4. Post fittings: Straight, angled, and spherical
 - 5. Anchoring systems: Studs, clevis, eye end, eye bolt, slotted, spacer baskets, radial clevis holder, cross clamp with support disk, slotted rope deflector, ball cage.

- D. Accessories: Provide threaded couplings, tensioning screws, cover disks, eye bolts, eye nuts, carabiners, shackles, clips, welded rings, screws, washers, lock nuts, hexagonal nuts, dome nuts, wall anchors, screws, and wire endcaps as required to complete the installation.

2.6 FINISH

- A. After fabrication, clean and de-scale stainless steel wire rope, fittings, and other components in accordance with ASTM A 380.
- B. Finish components with AISI No. 4 brushed satin finish in accordance with ASTM B 912.

2.7 FABRICATION

- A. Tolerances: Verify dimensions on site prior to shop fabrication.
- B. Fabricate stainless steel in accordance with AISI Steel Product Manual and the manufacturers requirements.
- C. Shop fabricate to designs indicated on Drawings and to meet performance requirements specified.
- D. Shop fabricate fittings, interfacing parts and assemblies so that field cutting adjustments are not necessary.
- E. Coordinate requirements, dimensions and spacings of wire rope railing system to ensure required factory drilled holes in supporting framework are correctly located.
- F. Make exposed joints butt, flush, and hairline.

PART 3 EXECUTION

3.1 EXAMINATION

- A. Before beginning installation, verify that conditions installed under other sections are

acceptable for installation of cable railing systems in accordance with manufacturer's installation instructions.

- B. Supply items required to be cast into concrete or embedded in masonry with setting templates, to appropriate Sections.
- C. Verify supporting posts and framework for stainless steel wire rope railings are prepared for attachment of anchors, fittings, wire rope, and wire netting and transfer of calculated loads.
- D. If conditions are the responsibility of another installer, notify Architect of unsatisfactory preparation before proceeding.

3.2 PREPARATION

- A. Verify alignment, support dimensions, and tolerances are correct.
- B. Inventory components to ensure all required items are available for installation. Inspect components for damage. Remove damaged components from site and replace.

3.3 INSTALLATION

- A. Install wire rope infill system in accordance with manufacturer's instructions and the approved shop drawings.
- B. Provide anchorage devices and fittings to secure to in-place construction; including threaded fittings for concrete inserts, toggle bolts and through-bolts.
- C. Install wire rope infill system plumb, level, square, and rigid without kinks or sags.
- D. Anchor wire rope railing system to mounting surfaces as indicated on the drawings.
- E. Separate dissimilar materials with bushings, grommets or washers to prevent electrolytic corrosion.
- F. Use manufacturer's supplied cable hardware.
- G. Ensure cables are clean, parallel to each other, and without kinks or sags.
- H. Tension cable with hand or hydraulic equipment so that no slack is visible.
- I. After final adjustment provide tamper resistant locktight materials on all fittings.

3.4 ADJUSTING AND CLEANING

- A. Adjust wire rope tension and connecting hardware.
- B. Remove temporary coverings and protection of adjacent work areas. Clean installed products in accordance with manufacturer's instructions before owner's acceptance.
- C. Do not use abrasive cleaners.
- D. Remove from project site and legally dispose of construction debris associated with this work.

3.5 PROTECTION

- A. Protect installed products until completion of project.

- B. Touch-up, repair or replace damaged products before Substantial Completion.
- C. Protect installed products and finished surfaces from damage during construction.
- D. Replace defective or damaged components as directed by Architect.
- E. Repair damaged factory-applied finish as directed by Architect.

END OF SECTION