**SECTION 05 73 15**

**FRAMELESS GLAZED METAL RAILINGS**

1. **GENERAL**
	1. **Summary**
		1. Section Includes:
			1. Structural Glazed Railings
				1. Glass balustrade panels.
				2. Aluminum base shoe.
				3. Stainless steel base shoe cladding.
				4. Polymer setting block and shims.
				5. Rubber gasket.
				6. Stainless horizontal cap rail.
				7. Stainless steel handrails.
				8. Stainless steel glass mounted brackets and caps.
			2. Stainless Steel Wall and Floor Mounted Handrails.
			3. Tempered Laminated Glass Railing Assemblies.
			4. Tempered Glass Railing Systems
		2. Products Installed But Not Supplied Under This Section
			1. Glazing: Section 08 80 00 - Glazing
			2. Glazing: Section 08 88 00 - Special Function Glazing
		3. Related Requirements
			1. Section 01 25 00 – Substitution Procedures
			2. Section 01 33 00 – Submittal Procedures
			3. Section 01 45 29 – Testing Laboratory Services
			4. Section 01 70 00 – Execution and Closeout Requirements
	2. References
		1. Abbreviations and Acronyms
			1. ga. Gage
			2. kN Kilonewton
			3. kN/m Kilonewton per meter
			4. lbs. Pounds
			5. O.D. Outside Diameter
			6. pfl Pounds per linear foot
		2. Reference Standards
			1. ASTM International (ASTM) Publications:

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| --- | --- |
| * + - * 1. E894 - 18
 | Standard Test Method for Anchorage of Permanent Metal Railing Systems and Rails for Buildings |
| * + - * 1. E935 - 21
 | Standard Test Methods for Performance of Permanent Metal Railing Systems and Rails for Buildings |
| * + - * 1. E2353-21
 | Standard Test Methods for Performance of Glazing in Permanent Railing Systems, Guards, and Balustrades |
| * + - * 1. E2358 - 17
 | Standard Test Methods for Performance of Glazing in Permanent Railing Systems, Guards, and Balustrades |

* + - 1. International Code Council ICC-ES

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| --- | --- |
| * + - * 1. ESR-4814
 | Evaluation Report |

* 1. **Submittals**
		1. Section 01 33 00
	2. **Action Submittals**
		1. Product Data
			1. Manufacturer’s technical product data for railing components and accessories.
		2. Shop Drawings
			1. Dimensioned drawings of railing assemblies indicating plans, elevations, sections, and attachment details.
		3. Samples
			1. Manufacturer’s finishes.
		4. Manufacturers’ Written Instructions
			1. Installation
			2. Cleaning
	3. **Closeout Submittals**
		1. Warranty Documentation
			1. Edging
		2. Record Documentation
		3. Section 01 70 00
	4. **Quality Assurance**
		1. Certifications
			1. Manufacturer Certified Installer
				1. Supervisor and Installers.
		2. Mock-ups
			1. Prepare \_\_\_\_\_ for approval by Architect.
			2. Mock-up will serve as a standard for installation of \_\_\_\_\_\_.
		3. Components and Fittings
			1. Furnished by the same manufacturer.
	5. **Delivery, Storage and Handling**
		1. Delivery and Acceptance Requirements
			1. Protect materials against damage during transit.
			2. Upon delivery, inspect for damage.
				1. Repair of minor defects and damage subject to Architect’s approval.
				2. Remove damaged and unacceptable parts and replace with new.
		2. Storage and Handling Requirements
			1. Store on site in clean, dry, covered area.
	6. **Warranty**
		1. Manufacturer Warranty: \_\_\_\_\_\_\_\_\_\_
		2. Section 01 70 00
1. **PRODUCTS**
	1. **Manufacturers**
		1. Acceptable Manufacturer
			1. FHC- Frameless Hardware Company

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* + - 1. Substitutions: Not permitted.
	1. **Performance/Design Criteria**
		1. Glass Railing Style
			1. Glass Rail System with Cap Rail
			2. Glass Rail System with Hand Rail
			3. Glass Rail System with Cap Rail and Hand Rail
		2. Basis of Design
			1. Frameless Hardware Company LLC (FHC) Achieve™ Dry Glaze Frameless Glass Railing System with L-Setting/Centering Block and Pre-Assembled Interior Shim (Patent pending) used for establishing quality, performance, appearance, including layout, material, attachment method and ease of installation; and complying with ICC-ES ESR-4814.
			2. Handrail Assembly:
				1. 50 plf (0.73 kN/m), on the top rail in all directions.
				2. 200 lbs. (0.89 kN), on top rail all directions or 50 lbs. (0.22 kN) on 1 square foot at all locations perpendicular to the glass balustrade.
				3. Loads not applied simultaneously.
	2. **Components**
		1. Floor Shim/Drain Blocks
			1. Drain Block: 3/8 inch tall
			2. Weld Block: ½ inch tall
			3. Wood Mount Angle
		2. Shoe Base
			1. Model: FHC #A1M
				1. Size: 2-13/16 inches wide by 4 1/8 inches tall.
			2. Model: FHC #A3M
				1. Size: 3 inches wide by 4 1/8 inches tall.
			3. Model: FHC #A5M
				1. Size: 3-1/8 inches wide by 4 1/8 inches tall.
			4. Material: Aluminum 6063-T5
		3. Base Cladding
			1. Material:
				1. 20 ga. Stainless Steel
				2. 20 ga. Aluminum
			2. Finish:
				1. #6 Brushed Stainless Steel
				2. #8 Polished Stainless Steel
				3. Satin Anodized
				4. Matte Black
		4. Cap Railing
			1. Size and Profile
				1. 1 ½ inch, Round

Material: Stainless Steel; 316 Alloy

Model: FHC #RC15

* + - * 1. 1.9 inches, Round [or] 2 inches, Round

Material: Stainless Steel; 316 Alloy

Model: FHC #RC20

* + - * 1. 2 inches by 1 inch, U-Channel [or] 2 inches by 1 inch, Rectangular

Material: Stainless Steel; 316 Alloy

Model: FHC #REC2

* + - * 1. 1 ½ inches, Square

Material: Stainless Steel; 316 Alloy

Model: FHC #SC15

* + - * 1. 2 inches, Square

Material: Stainless Steel; 316 Alloy

Model: FHC #SC20

* + - * 1. 1 inch by 1-5/16 inches, Rectangular

Material: Stainless Steel; 316 Alloy

Model: FHC #CRVG1

* + - * 1. 1 ¼ inch by 1-5/16 inches, Rectangular

Material: Stainless Steel; 304 Alloy

Model: FHC #CRVG7

* + - * 1. 1-5/16 inches by 1-5/16 inches, Square

Material: Stainless Steel; 304 Alloy

Model: FHC #CRVG8

* + - * 1. 1-7/8 inches, Round

Material: Aluminum

Model: FHC #CR19

* + - * 1. 1 inch by 1-5/16 inches, Rectangular

Material: Aluminum

Model: FHC #CRU1

* + - * 1. 1 ¼ inches by 1-5/16 inches, Rectangular

Material: Aluminum

Model: FHC #CRU7

* + - 1. End Caps
				1. Standard Applied Flat
				2. Stabilizing Wall Mount Flat
				3. \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_
			2. Finish
				1. Brushed Stainless Steel (304 Alloy)
				2. Polished Stainless Steel (304 Alloy)
				3. Satin Anodized
				4. Matte Black
				5. Custom Powder Coated: \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_
		1. Internal Handrail Cap Connection Sleeves
			1. Size and Profile
				1. Sized to fit over glass edge, U-shape [or] Tube

Material: Metal compatible with handrail cap.

* + 1. Handrail Tubing
			1. Size and Profile
				1. 1 ½ inch, Round

Material: Stainless Steel

Model: FHC #THR15

* + - * 1. 1 ½ inch, Round Heavy Duty

Material: Stainless Steel

Model: FHC #THD15

* + - * 1. 1 ½ inch, Square

Material: Stainless Steel

Model: FHC #THS15

* + - * 1. 2 inches by 1 inch, Rectangular

Material: Stainless Steel

Model: FHC #PR12

* + - * 1. 1 ½ inch, Round

Material: Aluminum

Model: FHC #AHR15

* + 1. Handrail Brackets
			1. Size and Profile
				1. 1 ½ inch, Round
				2. 1.9 inches, Round
				3. U-Channel Cap Rail
				4. 1 ½ inches, Square
				5. 2 inches, Square
				6. 1 ½ inches by 2 inches, Rectangular
			2. Attachment
				1. Elysian Series, FHC #HB2
				2. Valley Series, FHC #HB3
				3. Highland Series, FHC #HB4
				4. Brea Series, FHC #HB5
				5. Melrose Series, FHC #HB6
			3. Finish
				1. Match handrail.
	1. **Fabrication**
		1. Fabricate handrail assembly components to lengths and configurations to comply with approved shop drawings.
		2. Machine joint edges smooth and plane to produce hairline seams when site assembled.
1. **EXECUTION**
	1. **Examination**
		1. Verification of Conditions
			1. Examine areas and identify conditions detrimental to work.
			2. Proceed with installation after unsatisfactory conditions have been corrected.
	2. **Preparation**
		1. Protection of In-Place Conditions
			1. Exercise care in using equipment and installing railings.
			2. Provide means to protect other work from damage.
	3. **Installation**
		1. General
			1. Comply with ICC-ES ESR-4814 Report, and manufacturer’s written installation instructions and approved Shop Drawings for installing railings, accessories and components.
		2. Perform cutting, drilling and fitting for installing metal railings.
			1. Fit exposed connections together to form tight, hairline joints.
			2. Install railings level, plumb, square, true to line; and without distortion, warp, or rack.
			3. Measure from established lines and levels.
			4. Set railings accurately in location, alignment, and elevation.
		3. Prefinished metal railing components:
			1. Do not weld, cut, or abrade surfaces coated or finished after fabrication; and intended for field connection by mechanical means.
			2. Insulate metals from incompatible materials with [primer] or [bituminous paint].
		4. Railing:
			1. Align and adjust railing before anchoring.
			2. Match alignment at abutting joints.
			3. Tolerances for rails to rake of steps and ramps:
				1. Horizontal Members from level: ¼ inch in 12 Feet (5 mm in 3 m).
				2. Sloping Members from parallel: ¼ inch in 12 Feet (5 mm in 3 m).
			4. Fastening: Use anchors and fasteners to secure railing and transfer loads to in-place construction.
	4. **Field Quality Control**
		1. Field Tests
			1. Test completed railing assemblies representing each type of railing design and condition.
				1. Comply with ASTM E894, ASTM E935, ASTM E2353, and ASTM E2358.
			2. Comply with Section 01 45 29.
		2. Inspections
			1. Verify components are installed following manufacturer’s installation instructions and meet tolerances.
			2. Verify finishes are not marred or damaged.
		3. Non-Conforming Work
			1. Repair railing assemblies.
			2. Remove and replace railing assemblies that cannot be repaired to satisfaction of Architect.
			3. Retest and inspect.
	5. **Cleaning**
		1. Railing Surfaces
			1. General:
				1. Wash with clean water and mild detergent.
				2. Avoid abrasive chemicals, detergents and implement that may mar or gouge material.
			2. Aluminum and Stainless Steel:
				1. Wash with water and soap.
				2. Rinse with clean water.
				3. Wipe dry.
			3. Glass:
				1. Clean and polish in accordance with manufacturer written instructions.
				2. Remove excess glazing sealant compounds, dirt, debris and other substances.
				3. Wash exposed surfaces four days, maximum, before inspection to establish date of [Substantial Completion] [or] [Project Completion].
			4. Protective Film:
				1. Remove from metal surfaces.
	6. Closeout Activities
		1. \_\_\_\_\_\_\_\_\_\_\_\_
	7. Protection
		1. Protect railings and finishes from damage or deterioration.
			1. Provide temporary protective covering approved by manufacturer.
			2. Remove protective coverings at [Substantial Completion] [or] [Project Completion].
		2. Repair damaged components.
			1. Follow manufacturer’s written recommendations.
			2. If component cannot be restored to like-new condition, provide new component.
		3. Restore damaged finishes.
			1. Refinish unit in field or shop.
			2. Reinstall and adjust.

**END OF SECTION**