

**ENGINEERING SPECIFICATION**

**DYNAROUND RG SLIMLINE™**

**FIBERGLASS ROOF GUARDRAIL SYSTEM**

SECTION 06 81 13

FIBERGLASS REINFORCED PLASTICS (FRP) FABRICATIONS

DYNAROUND RG SLIMLINE™ FIBERGLASS ROOF GUARDRAIL SYSTEM

PART 1 - GENERAL

1.1 SCOPE OF WORK

- A. This specification is for a ballasted fiberglass round tube guardrail system in compliance with Sections 1015.3, 1015.4.4, 1015.6, 1015.7, 1607.8.1, 1607.8.1.1, and 1607.8.1.2 of the 2018 International Building Code and OSHA 29 CFR 1910.28 (b)(1) Protection from Fall Hazards, 1910.29 (b) Guardrail Systems, 1926.501 (b) (1) Fall Protection, and 1926.502 (b) Guardrail Systems.

1.2 REFERENCES

- A. The publications listed below (latest revision applicable) form a part of this specification to the extent referenced herein. The publications are referred to within the text by the designation only.

AMERICAN SOCIETY FOR TESTING AND MATERIALS (ASTM) Test Methods and Standards:

ASTM D-638-Tensile Properties of Plastics

ASTM D-790-Flexural Properties of Unreinforced and Reinforced Plastics

ASTM D-2344-Apparent Interlaminar Shear Strength of Parallel Fiber Composites by Short Beam Method

ASTM D-696-Coefficient of Linear Thermal Expansion for Plastics

ASTM E-84-Surface Burning Characteristics of Building Materials

ASTM A47 – Standard Specification for Ferrite Malleable Iron Castings

ASTM A153 – Standard Specification for Zinc Coating (Hot-Dip) on Iron and Steel Hardware

INTERNATIONAL CODE COUNCIL, INC.  
The International Building Code, 2018

THE OCCUPATIONAL HEALTH AND SAFETY ADMINISTRATION  
Code of Federal Regulations (CFR), Title 29, Section 1910.29, 1910.29, 1926.501, 1926.502

1.3 SUBMITTALS

- A. When required by the contract, the CONTRACTOR shall furnish shop drawings of all fabricated railings and accessories in accordance with the provisions of this Section.
- B. When required by the contract, the CONTRACTOR shall furnish manufacturer's shop drawings clearly showing material sizes, types, styles, part or catalog numbers, complete

details for the fabrication of and erection of components including, but not limited to, location, lengths, type and sizes of fasteners, clip angles, member sizes, and connection details.

- C. The CONTRACTOR shall submit the manufacturer's published product data including product data sheets, installation instructions, and typical assembly details.
- D. The CONTRACTOR may be requested to submit sample pieces of each item specified herein for acceptance by the ENGINEER as to quality and color. Sample pieces shall be manufactured by the method to be used in the WORK.

#### 1.4 QUALITY ASSURANCE

- A. All items to be provided under this Section shall be furnished only by manufacturers having a minimum of ten (10) years' experience in the design and manufacture of similar products and systems. Additionally, if requested, a record of at least five (5) previous, separate, similar successful installations in the last five (5) years shall be provided.
- B. Manufacturer shall offer a 3-year limited warranty on all FRP products against defects in materials and workmanship.
- C. Manufacturer shall be certified to the ISO 9001-2008 standard.
- D. Manufacturer shall provide proof of certification from at least two other quality assurance programs for its facilities or products (DNV, ABS, USCG, AARR).

#### 1.5 PRODUCT DELIVERY AND STORAGE

- A. Delivery of Materials: Manufactured materials shall be delivered in original, unbroken pallets, packages, containers, or bundles bearing the label of the manufacturer.
- B. Storage of Products: Store products in the manufacturer's original packaging until needed. All materials shall be carefully handled to prevent them from abrasion, cracking, chipping, twisting, other deformations, and other types of damage.

### PART 2 - PRODUCTS

#### 2.1 MANUFACTURER:

- A. Roof guardrail system to be DynaRound RG Slimline™ as manufactured by

**Fibergrate Composite Structures Inc.**

5151 Belt Line Road, Suite 1212  
Dallas, Texas 75254-7028 USA  
(800) 527-4043 Phone (972) 250-1530 Fax

Website: [www.fibergrate.com](http://www.fibergrate.com)

E-mail: [info@fibergrate.com](mailto:info@fibergrate.com)

#### 2.3 SYSTEM

- A. The installed roof guardrail system is to have a minimum finished height of 42 inches (1067 mm) with a mid-rail installed at 21 inches (533 mm) above the walking surface. The

completed system should include posts, rails, fittings, and post bases sufficient to fulfill the requirements of this specification.

- B. The finished system must not penetrate the roof in any way. The roof should be protected from abrasion as recommended by the roofing manufacturer.
- C. Structural Performance – The completed system must be capable of withstanding a 200 lb (890 N) load applied downward or outward to any point on the top rail without failure. When the 200 lb load is applied in a downward direction, the top rail must not deflect to a height of less than 39 inches (990 mm) above the walking surface. The midrail must be capable of withstanding a force of 150 lb (667 N) applied in either a downward or outward direction without failure. Top rail and mid-rail loads do not need to be applied concurrently.

## 2.3 MATERIALS

- A. All posts, rails, and 'F' Outrigger Assemblies are to be DYNAFORM® FRP structural shapes manufactured by the pultrusion process. The structural shapes shall be composed of fiberglass reinforcement and resin in qualities, quantities, properties, arrangements and dimensions as necessary to meet the design requirements and dimensions specified in the Contract Documents.
- B. Fiberglass reinforcement shall be a combination of continuous roving, continuous strand mat, and surfacing veil in sufficient quantities as needed by the application and/or physical properties required.
- C. Resin shall be DYNAFORM® VEFR, fire retardant vinyl ester with chemical formulation necessary to provide the corrosion resistance, strength and other physical properties as required.
- D. All finished surfaces of FRP items and fabrications shall be smooth, resin-rich, free of voids and without dry spots, cracks, crazes or unreinforced areas. All glass fibers shall be well covered with resin to protect against their exposure due to wear or weathering.
- E. All pultruded structural shapes shall be further protected from ultraviolet (UV) attack with 1) integral UV inhibitors in the resin, 2) a synthetic surfacing veil to help produce a resin rich surface, and 3) an appropriate UV resistant coating for outdoor exposures.
- F. All FRP products shall have a tested flame spread rating of 25 or less per ASTM E-84 Tunnel Test.
- G. Posts, rails, and 'F' Outrigger Assemblies are to be pultruded 1.9" OD x 0.2" wall (48.3 mm x 5.1 mm) round tube, integrally pigmented yellow, with the minimum longitudinal mechanical properties listed below:

Property	ASTM Method	Value	Units
Flexural Strength (Full Section)	---	70,000 (482)	psi (MPa)
Flexural Modulus (Full Section)	---	5.0 x 10 <sup>6</sup> (34.4)	psi (GPa)
Short Beam Shear (Transverse)	D-2344	4,500 (31)	psi (MPa)
Shear Modulus (Transverse)	N/A	4.5 x 10 <sup>5</sup> (3.1)	psi (GPa)
Density	D792	0.062 – 0.070 (1.71 – 1.93)	lb/in <sup>3</sup> (g/cc)

Coefficient of Thermal Expansion	D-696	$8.0 \times 10^{-6}$ ( $1.4 \times 10^{-6}$ )	in/in/°F (cm/cm/°C)
Flame Spread	E-84	25 or less	N/A

- H. All components in contact with the building roof are to be supplied with a rubber anti-skid surface to protect with the roof.
- I. The Dynaround Slimline Base is to weigh 87 lb (39.5 kg), have a circular base with a diameter of 24.5 inches (622 mm), include four sockets for the installation of posts, and have slots for the installation of lock pins which allow a continuous 90 degrees of rotational adjustment for the posts.
- J. All other fittings used for guardrail assembly are to be galvanized cast iron and feature 9/16-inch diameter socket head set screws for clamping to the 1.9" OD x 0.2" wall (48.3 mm x 5.1 mm) FRP round tube.

## 2.4 FABRICATION

- A. All posts, returns, and 'F' Outrigger Assemblies are to be shop fabricated to the correct size and labeled to insure correct assembly. Caps are to be shop bonded to the ends of the posts prevent the intrusion of foreign material. At the 'F' Outrigger Assemblies, the posts and outriggers are to be reinforced where they insert into the Sliper to insure maximum strength.
- B. The horizontal rails are to be supplied in 20 ft (6.1 m) lengths. Where needed, horizontal rails may be cut to length following the manufacturer's directions. The cut ends are to be sealed with a spray polyurethane as recommended by the manufacturer.

## PART 3 - EXECUTION

### 3.1 PREPARATION

- A. Inspect and inventory all DynaRound RG Slimline components to verify that all materials are available for installation and to verify that no components are damaged prior to installation
- B. Inspect the roof to verify that the area where the DynaRound RG Slimline is to be installed is prepared for installation. Remove any debris/obstructions in the installation area and verify all field dimensions prior to assembling the DynaRound RG Slimline System.
- C. Verify that the locations where the Slimline Post Bases will be placed are free of debris and that the roof surface has been protected as directed by the roofing manufacturer.

### 3.2 INSTALLATION

- A. Install the DynaRound RG Slimline system following the manufacturer's detailed installation instructions.
- B. The set screws in the fittings should be torqued to the values listed in the installation instructions and thread locking compound applied at final assembly to prevent loosening.
- C. For installations with no parapet wall, the Slimline bases are to be installed no closer than 12 inches (305 mm) from the roof edge and the posts spaced at a 5 ft (1524 mm) on center. If a parapet is present, the bases are to be spaced at a maximum of 8 ft (2438 mm) on center

and the bases placed as close to the parapet as possible.

### 3.4 INSPECTION

- A. The complete installation should be inspected to verify correct assembly, post spacing, and that all set screws have been properly torqued and thread lock compound applied.

END OF SECTION