

ENGINEERING SPECIFICATION

U.S. CUSTOMARY UNITS

PULTRUDED HIGH LOAD CAPACITY (HI)
SAFE-T-SPAN[®] FIBERGLASS GRATING

SECTION 06 74 13

FIBERGLASS REINFORCED PLASTICS (FRP) FABRICATIONS

PULTRUDED HIGH LOAD CAPACITY (HI) GRATING

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

- A. Drawings and general provisions of Contract, including General and Supplementary Conditions and Division 1 Specification Sections, apply to this section.
- B. 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:

ASTM D 635 Rate of Burning and/or Extent and Time of Burning of Self-Supporting Plastics in a Horizontal Position

ASTM E 84 Standard Test Method for Surface Burning Characteristics of Building Materials

1.2 SUMMARY

- A. This section includes shop fabricated fiberglass reinforced plastic (FRP) Pultruded High Load Capacity (HI) Grating.

1.3 SCOPE OF WORK

- A. Furnish, fabricate (where necessary), and install all fiberglass reinforced plastic (FRP) HI gratings with all appurtenances, accessories and incidentals necessary to produce a complete, operable and serviceable installation as specified herein.

1.4 SUBMITTALS

- A. Submit manufacturer's shop drawings of all fabricated gratings 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 and connection details.
- B. Submit the manufacturer's published literature including structural design data, structural properties data, grating load/deflection tables, corrosion resistance tables, certificates of compliance, test reports as applicable and design calculations for systems not sized or designed in the contract documents.
- C. Submit sample pieces of each item specified herein, manufactured by the method used in the work and as to quality and color.

1.5 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).
- E. Manufacturer shall provide proof, via independent testing, that materials proposed as a solution do not contain heavy metals in amounts greater than that allowed by current EPA requirements.

1.6 DESIGN CRITERIA

- A. The design criteria of the FRP products including connections shall be in accordance with governing building codes and generally accepted standards in the FRP industry.
- B. Allowable Spans for AASHTO H-20 truck loading shall not exceed those shown in the following tables:

Allowable Spans for AASHTO H20 Truck⁽⁴⁾ Loading

- Dual Wheels
- Axle Load: 32,000 lb
- Wheel Load (lb) (1/2 Axle Load + 30% impact): 20,800

	Load Distribution		Allowable Span ^(2,3)				
	Parallel to Axle ⁽¹⁾	Perp. to Axle	HI3710	HI3715	HI3720	HI3725	HI3730
HI37	20" + 2"	20"	1'-4"	1'-11"	2'-5"	2'-10"	3'-5"
HI47	20" + 2-3/8"	20"	1'-3"	1'-10"	2'-3"	2'-9"	3'-3"
HI58	20" + 3"	20"	1'-2"	1'-9"	2'-2"	2'-7"	3'-1"

Notes:

- (1) Load is carried by the grating load bars immediately under wheel + two additional load bars, one on each side of wheel.
- (2) Allowable Span is based on a 0.25" maximum deflection and a Factor of Safety of 3.0. Other criteria may be required by certain construction codes. Check code requirements to determine design criteria.
- (3) Allowable span is strongly dependent on wheel width and vehicle weight/load capacity. If your application varies from the values given in this table, Contact Fibergrate Engineering for Assistance.

(4) Load based on Standard Truck Load as defined in AASHTO Standard Specifications for Highway Bridges, 17th Ed. This does not imply that the allowable span given meets the deflection requirements of this specification.

1.7 PRODUCT DELIVERY AND STORAGE

- A. All gratings and components shall be shop fabricated, piece match marked to assembly or erection drawings.
- B. Delivery of Materials: All manufactured materials shall be delivered in original, unbroken pallets, packages, containers, or bundles bearing the label of the manufacturer. Adhesives, resins and their catalysts and hardeners shall be crated or boxed separately and noted as such to facilitate their movement to a dry indoor storage facility.
- C. Storage of Products: All materials – before, during and after shipment - shall be carefully handled to prevent them from abrasion, cracking, chipping, twisting, other deformations, and other types of damage. Store items in an enclosed area and free from contact with soil and water. Store adhesives, resins and their catalysts and hardeners in dry indoor storage facilities between 70 and 85 degrees Fahrenheit (21 to 29 degrees Celsius) until they are required.

PART 2 – PRODUCTS

2.1 GENERAL

- A. All FRP items furnished under this Section shall be composed of fiberglass reinforcement and resin in qualities, quantities, properties, arrangements and dimensions as necessary to meet the design requirements and dimensions as specified in the Contract Documents.
- B. Fiberglass reinforcement shall be continuous roving in sufficient quantities as needed by the application and/or physical properties required.
- C. Resin shall be Vinyl Ester with chemical formulations as 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 grating products shall have a tested flame spread rating of 25 or less per ASTM E-84 Tunnel Test. Gratings shall not burn past the 25 mm reference mark and will be classified HB per ASTM D635.
- F. All mechanical grating clips shall be manufactured of Type 316SS (stainless steel).

G. Pultruded High Load Gratings shall be Safe-T-Span® 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

E-mail: info@fibergrate.com

2.2 PULTRUDED HIGH LOAD CAPACITY (HI) FRP GRATING

- A. Manufacture: Grating components shall be high strength and high stiffness pultruded elements having a maximum of 65% of glass content (by weight) of continuous roving and continuous strand mat fiberglass reinforcements. The finished surface of the product shall be provided with a surfacing veil to provide a resin rich surface which improves corrosion resistance and resistance to ultraviolet degradation. Bearing bars shall be interlocked and epoxied in place with a two-piece cross rod system to provide a mechanical and chemical lock.
- B. Color: Dark Gray.
- C. Depth: 1", 1-1/2", 2", 2-1/2" or 3" with a tolerance of $\pm 1/16$ ".
- D. Non-slip surfacing: Grating shall be provided with an aluminum oxide grit bonded and baked to the top surface of the finished grating product and sealed with a compatible resin to insure retention of grit particles.
- E. Mesh Configuration HI37: 1" load bar spacing; 6" tie bar spacing on centers for 1", 1-1/2" and 2" deep grating; and 3" tie bar spacing on centers for 2-1/2" and 3" deep grating.
- F. Mesh Configuration HI47: 1-3/16" load bar spacing; 6" tie bar spacing on centers for 1", 1-1/2" and 2" deep grating; and 3" tie bar spacing on centers for 2-1/2" and 3" deep grating.
- G. Mesh Configuration HI58: 1-1/2" load bar spacing; 6" tie bar spacing on centers for 1", 1-1/2" and 2" deep grating; and 3" tie bar spacing on centers for 2-1/2" and 3" deep grating.
- H. Substitutions: Other products of equal strength, stiffness, corrosion resistance and overall quality may be submitted with the proper supporting data to the engineer for approval.

2.3 GRATING FABRICATION

- A. Measurements: Grating supplied shall meet the dimensional requirements and tolerances as shown or specified. The Contractor shall provide and/or verify measurements in field for work fabricated to fit field conditions as required by grating manufacturer to complete the work.
- B. Layout: Each grating section shall be readily removable, except where indicated on drawings. Gratings shall be fabricated free from warps, twists, or other defects which affect appearance and serviceability.
- C. Sealing: All shop fabricated grating cuts shall be resin sealed to provide maximum corrosion resistance. All field fabricated grating cuts shall be coated similarly by the contractor in accordance with the manufacturer's instructions.

- D. Hardware: Type 316 stainless steel hold-down clips shall be obtained by the contractor and spaced as per the recommendation of the manufacturer.

PART 3 - EXECUTION

3.1 INSPECTION

- A. Shop inspection is authorized as required by the Owner and shall be at Owner's expense. The fabricator shall give ample notice to Contractor prior to the beginning of any fabrication work so that inspection may be provided.
- B. The grating shall be as free, as commercially possible, from visual defects such as foreign inclusions, delamination, blisters, resin burns, air bubbles and pits. The surface shall have a smooth finish.

3.2 INSTALLATION

- A. Contractor shall install gratings in accordance with manufacturer's assembly drawings and written instructions.
- B. Field cut and drill fiberglass reinforced plastic products with carbide or diamond tipped bits and blades. Seal cut or drilled surfaces in accordance with manufacturer's instructions. Follow manufacturer's instructions when cutting or drilling fiberglass products or using resin products; provide adequate ventilation.
- C. All grating panels, when in place, shall be firmly fastened to their supports using a minimum of two hold down clips at a maximum spacing of 4'-0" on center per support with a minimum of four hold down clips per grating panel. Gratings installed in trenches may be installed without hold down clips if the grating is adequately restrained to prevent horizontal sliding, vertical lifting, or tipping.