

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

SECTION 06610
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

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 experience in the design and manufacture of similar products and systems. If requested, experience shall be demonstrated by a record of at least five (5) previous, separate, similar successful installations in the last five (5) years.
- B. Substitution of any component or modification of system shall be allowed when approved by the Architect or Engineer.
- C. Fabricator shall be experienced in successfully producing FRP fabrications similar to that indicated for this project, with sufficient production capacity to produce required units without causing delay in the work.
- D. In addition to requirements of these specifications, comply with manufacturer's instructions and recommendations for work.

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 Vehicular Loads shall not exceed those shown in the following tables:

Allowable Spans for Vehicular Loads – HI47 Pultruded Grating

	Wheel Load (lb) (1/2 Axle Load + 30% impact)	Load Distribution		Allowable Span (2,3)				
		Parallel To Axle (1)	Perpendicular to Axle	HI4710	HI4715	HI4720	HI4725	HI4730
AASHTO Standard Truck (4) 3,000 lb Axle Load Dual Wheels (*formerly AASHTO H-20)	20,800	20" x 2-3/8"	8"	0'-9"	1'-2"	2'-1"	2'-5"	3'-2"
Automobile Traffic 5,000 lb Vehicle 1,500 lb Load 55% Drive Axle Load	2,220	8" + 2-3/8"	8"	1'-4"	2'-4"	3'-11"	4'-9"	5'-10"
5 Ton Capacity Forklift 14,400 lb Vehicle 24,400 lb Total Load 85% Drive Axle Load	13,480	11" + 2-3/8"	11"	0'-8"	1'-1"	1'-9"	2'-1"	2'-8"
3 Ton Capacity Forklift 9,800 lb Vehicle 15,800 lb Total Load 85% Drive Axle Load	8,730	7" + 2-3/8"	7"	0'-8"	1'-1"	1'-9"	2'-1"	2'-8"
1 Ton Capacity Forklift 4,200 lb Vehicle 6,200 lb Total Load 85% Drive Axle Load	3,425	4" + 2-3/8"	4"	0'-9"	1'-4"	2'-9"	3'-3"	4'-3"

Allowable Spans for Vehicular Loads – HI58 Pultruded Grating

	Wheel Load (lb) (1/2 Axle Load + 30% impact)	Load Distribution		Allowable Span (2,3)				
		Parallel To Axle (1)	Perpendicular to Axle	HI5810	HI5815	HI5820	HI5825	HI5830
AASHTO Standard Truck (4) 32,000 lb Axle Load Dual Wheels (*formerly AASHTO H-20)	20,800	20" + 3"	8"	0'-8"	1'-0"	1'-9"	1'-11"	2'-7"
Automobile Traffic 5,000 lb Vehicle 1,500 lb Load 55% Drive Axle Load	2,220	8" + 3"	8"	1'-2"	1'-11"	3'-3"	3'-11"	4'-10"
5 Ton Capacity Forklift 14,400 lb Vehicle 24,400 lb Total Load 85% Drive Axle Load	13,480	11" + 3"	11"	0'-8"	0'-11"	1'-6"	1'-9"	2'-3"
3 Ton Capacity Forklift 9,800 lb Vehicle 15,800 lb Total Load 85% Drive Axle Load	8,730	7" + 3"	7"	0'-7"	0'-10"	1'-6"	1'-8"	2'-2"
1 Ton Capacity Forklift 4,200 lb Vehicle 6,200 lb Total Load 85% Drive Axle Load	3,425	4" + 3"	4"	0'-8"	1'-1"	2'-3"	2'-7"	3'-6"

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 AASHTO Standard Truck Load as defined in AASHTO LRFD Bridge Design Specifications, 2nd 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 (HLC) 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 plus or minus 1/16".
- D. 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.
- E. 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.

- F. 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 coated with vinyl ester resin 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 provided 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. Lock grating panels securely in place with hold-down fasteners, if required.
- 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. Install items specified as indicated and in accordance with manufacturer's instructions.