

ENGINEERING SPECIFICATION

PULTRUDED FIBERGLASS GRATING
SAFE-T-SPAN[®] HIGH LOAD CAPACITY (47% OPEN AREA)
VINYL ESTER

SECTION 06610

FIBERGLASS REINFORCED PLASTICS (FRP) FABRICATIONS HIGH LOAD CAPACITY (HI) PULTRUDED INDUSTRIAL GRATING

PART 1 - GENERAL

1.1 SCOPE OF WORK

- A. The CONTRACTOR shall furnish, fabricate (where necessary), and install all fiberglass reinforced plastic (FRP) items, with all appurtenances, accessories and incidentals necessary to produce a complete, operable and serviceable installation as shown on the Contract Drawings and as specified herein, and in accordance with the requirements of the Contract Documents.

1.2 REFERENCES

- A. Drawings and general provisions of Contract, including General and Supplementary Conditions and Division 1 Specification Sections, apply to this section.
- B. DRAFT of the Fiberglass Grating Manual, ANSI/ASCE/ACMA.
- C. 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 D 732 Shear Strength of Plastics by Punch Tool
- ASTM E 84 Surface Burning Characteristics of Building Materials

1.3 CONTRACTOR SUBMITTALS

- A. The CONTRACTOR shall furnish shop drawings of all fabricated gratings and accessories in accordance with the provisions of this Section.
- B. 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 literature including structural design data, structural properties data, grating load/deflection tables, corrosion resistance tables, certificates of compliance, test reports as applicable, concrete anchor systems and their allowable load tables, and design calculations for systems not sized or designed in the contract documents.

- D. The CONTRACTOR shall 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 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 table:

	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
 AASSTO Standard Truck (4) 32,000 lb Axle Load Dual Wheels (*formerly AASHTO H-20)	20,800	20" + 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"

Notes:

1. Load is carried by the grating load bars immediate 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. The 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 on this table, contact Fibergrate Engineering for application assistance.
4. Load based on the AASHTO Standard Truck Load as defined in AASHATO LRFD Bridge Design Specifications, 2nd Ed. This does not imply that the allowable span meets the deflection requirements of this specification.

1.6 PRODUCT DELIVERY AND STORAGE

- A. All gratings and components shall be shop fabricated and 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 MANUFACTURER

- A. High Load Pultruded Grating 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

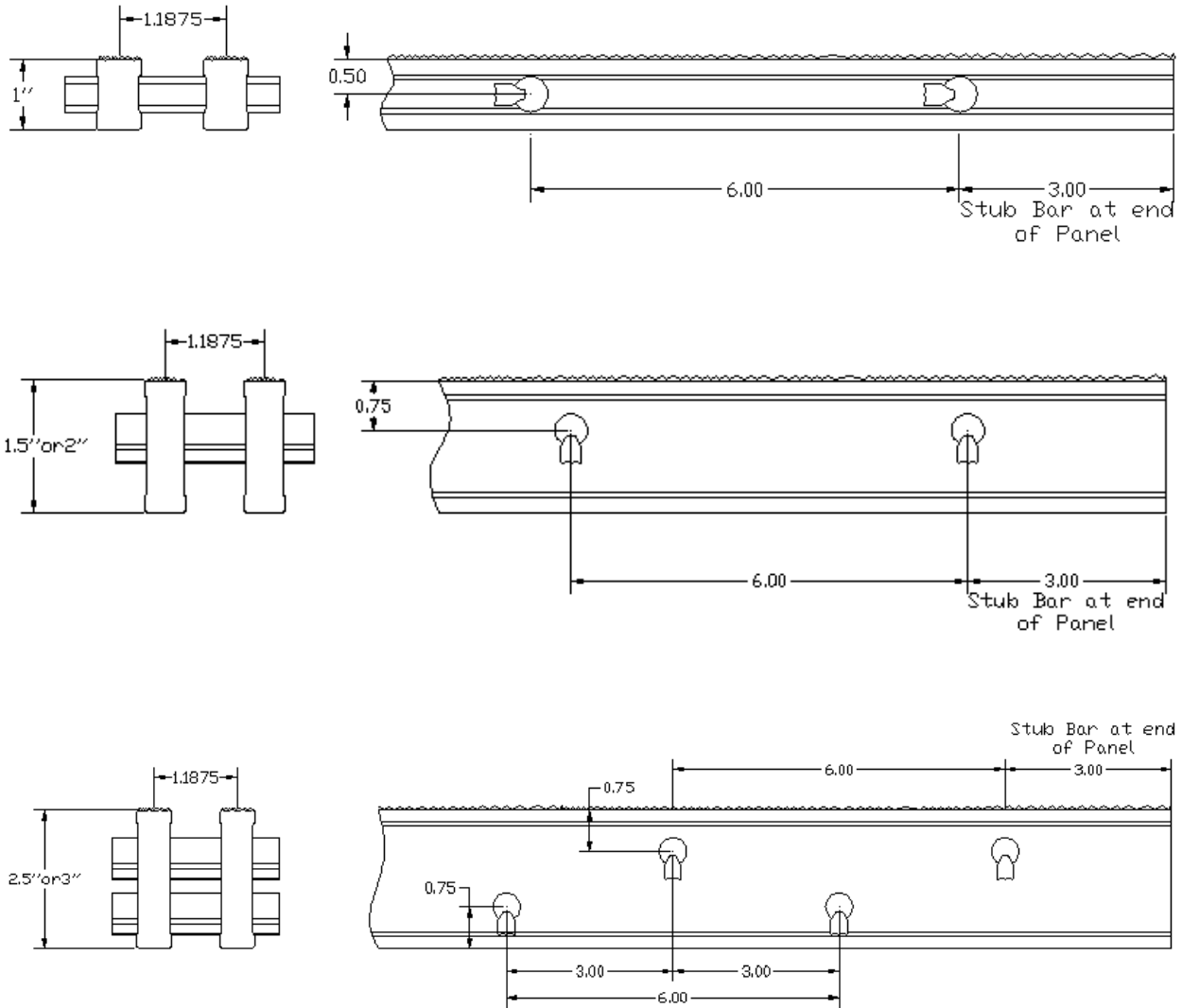
2.2 GENERAL

- B. 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.
- C. 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.
- D. Resins shall be VINYL ESTER with chemical formulations as necessary to provide the corrosion resistance, strength and other physical properties as required.

- E. 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.
- F. All pultruded structural shapes shall be further protected from ultraviolet (UV) light with an integral UV inhibitors in the resin and a synthetic surfacing veil to help produce a resin rich surface.
- G. All FRP 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.
- H. All grating clips shall be manufactured of Type 316SS (stainless steel).

2.3 HIGH LOAD CAPACITY (HI) PULTRUDED GRATING (47% Open Area)

- A. Manufacture: Grating components shall be high strength and high stiffness pultruded elements having a maximum of 70% and a minimum of 60% 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. Cross rods should be below the walking surface of the grating. Gratings with cross rods that are flush with the walking surface are excluded.
- B. Non-slip surfacing: Grating shall be provided with an aluminum oxide grit bonded and baked to the top surface of the finished grating product.
- C. Fire rating: Grating shall be fire retardant with a tested flame spread rating of 25 or less when tested in accordance with ASTM E 84. Manufacturer may be required to provide certification of ASTM E84 test on grating panels from an independent testing laboratory. Test data shall be from full scale testing of actual production grating, of the same type and material supplied on the project. Test data performed only on the base resin shall not be acceptable.
- D. Resin system: The resin system used in the manufacture of the grating shall be VEFR. Manufacturer may be required to submit corrosion data from tests performed on actual grating products in standard chemical environments. Corrosion resistance data of the base resin from the manufacturer is not a true indicator of grating corrosion resistance and shall not be accepted.
- E. Color: Dark Gray.
- F. Depth: **PICK ONE** of the available thickness (1", 1-1/2", 2", 2-1/2" **or** 3" deep) load bars with a tolerance of plus or minus 1/32".
- G. Mesh Configuration: 1-3/16" load bar spacing, a 6" tie bar spacing on centers placed 1/2" from the top of the load bar **for picking** (1" deep) HI47 grating, 3/4" from the top of the load bar **for picking** (1-1/2" **or** 2" deep) HI47 grating and two 6" tie bars spacing on centers placed 3/4" from the top and bottom of the load bar **for picking** (2-1/2" **or** 3" deep) HI47 grating as shown below. Grating shall be SAFE-T-SPAN[®] HI4710, HI4715, HI4720, HI4725 or HI4730, manufactured by **Fibergate Composite Structures Incorporated**.



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.

2.4 GRATING FABRICATION

- A. Measurements: Grating supplied shall meet the minimum dimensional requirements 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. Determine correct size and locations of required holes or cutouts from field dimensions before grating fabrication.
- B. Layout: Each grating section shall be readily removable, except where indicated on drawings. Manufacturer to provide openings and holes where located on the contract drawings. Grating supports shall be provided at openings in the grating by contractor where necessary to meet load/deflection requirements specified herein. Grating openings which fit around protrusions (pipes, cables, machinery, etc.) shall be discontinuous at approximately the centerline of opening so each section of grating is readily removable.

- 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: If required by the contractor, Type 316 stainless steel hold-down clips shall be provided and spaced at a maximum of four feet apart with a minimum of four per piece of grating, or as recommended by 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. 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 grit top surface.

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 as specified herein. 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.