

ENGINEERING SPECIFICATION

**PULTRUDED FIBERGLASS REINFORCED GRATING
SAFE-T-SPAN I6015P - PHENOLIC RESIN
PULTRUDED FIBERGLASS REINFORCED TREADS
SAFE-T-SPAN I6015P-T - PHENOLIC RESIN**

SECTION 06610

October 18, 2004

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Revision 1

FIBERGLASS REINFORCED PLASTICS (FRP) FABRICATIONS

PULTRUDED PHENOLIC 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. 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:

U.S. Coast Guard Draft Memorandum: Policy File Memorandum on the Use of Fiber Reinforced Plastic (FRP) Deck Grating (dated 2 February 1998)

ASTM D 635 Standard Test Method for Rate of Burning and/or Extent and Time of Burning of Plastics in a Horizontal Position

ASTM E 84 Surface Burning Characteristics of Building Materials

ASTM D 2863 Minimum Oxygen Concentration to Support Candle-like Combustion of Plastics (Oxygen Index)

ASTM E 662 Standard Test Method for Specific Optical Density of Smoke Generated by Solid Materials

UL 94-97 Tests for Flammability of Plastic Materials

Mil 14H Toxicity Test

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, if required, 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 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. 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.
- B. Storage of Products: All materials 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 a dry, indoor storage facility, between 70 and 85 degrees Fahrenheit (21 to 29 degrees Celsius) until they are required.

1.5 QUALITY ASSURANCE

- A. All items to be provided under this Section shall be furnished only by manufacturers having a minimum of five (5) 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 9001-2000 standard.

- D. Manufacturer shall provide proof of certification from at least two other quality assurance programs for its facilities or products (UL, DNV, ABS, USCG, AARR).

PART 2 - PRODUCTS

2.1 MANUFACTURER

- A. Pultruded grating shall be Safe-T-Span Phenolic as manufactured by:

Fibergrate Composite Structures Inc.
5151 Belt Line Road, Suite 700
Dallas, Texas 75254-7028 USA
(800) 527-4043 (972) 250-1530 Fax

2.2 GENERAL

- A. All FRP items furnished under this Section shall be composed of fiberglass reinforcements and resins 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 a combination of phenolic compatible continuous rovings and continuous strand mats in sufficient quantities as needed by the application and/or physical properties required.
- C. Resin shall be PHENOLIC with chemical formulations as necessary to provide required corrosion resistance, strength, flame & smoke and other physical properties.
- D. All secondary bonding and grit adhesion shall be epoxy unless otherwise specified.
- E. All finished surfaces of FRP items and fabrications shall be smooth, free of voids and without dry spots, cracks, crazes or unreinforced areas. All glass fibers shall be saturated with resin to protect against their exposure due to wear or weathering.
- F. All grating clips shall be manufactured of Type 316SS (stainless steel).

2.3 PULTRUDED GRATING

- A. Manufacture: Grating components shall be high strength and high stiffness pultruded elements having a maximum of 80% and a minimum of 75% glass content (by weight) of continuous roving and continuous strand mat fiberglass reinforcements. Bearing bars shall be interlocked with a two piece cross rod system, adhesive bonded, 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 surface: Grating shall be provided with a quartz grit, adhesively bonded and baked to the top surface of the finished grating product.
- C. Coast Guard Rating: All gratings and treads shall have U.S. Coast Guard Approval and be certified to a Level 2 in accordance with the U.S. Coast Guard Draft Memorandum: Policy File Memorandum on the Use of Fiber Reinforced Plastic (FRP) Deck Grating (dated 2 February 1998)
- D. Fire rating: Uncoated grating shall have a tested flame spread index of 0 and a smoke developed index of 5 or less, when tested in accordance with the ASTM E-84 Tunnel Test. Coated grating shall have a tested flame spread index of 10 or less and a smoke developed index of 250 or less for the same test. Gratings shall also have a tested burn time of less than 30 seconds and an extent of burn rate of less than or equal to 10 millimeters per ASTM D635. 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.
- E. Gratings shall be classified as 94V-O by the UL 94 Test for Flammability and pass the ASTM D2863 test for 100% oxygen concentration. Ignition time shall be less than 98 seconds and burning time less than 15 seconds per the Mil 14H Toxicity Test. The phenolic grating shall also be tested in accordance with ASTM E662 with a non-flaming Dmc of 2.7 or less and Ds@4 min of 0; flaming Dmc of 35 or less and Ds@4 min of less than 2.
- F. Resin system: The resin system used in the manufacture and assembly of the grating shall be 100 % PHENOLIC. Manufacturer may be required to submit corrosion data from tests performed on actual grating products in standard chemical environments.
- G. Color: Natural Brown
- H. Depth: 1-1/2" deep load bars with a tolerance of plus or minus 1/32".
- I. Mesh Configuration: 1-1/2" load bar spacing; 6" tie bar spacing on centers. Grating shall be SAFE-T-SPAN I6015P as manufactured by **Fibergrate Composite Structures Incorporated**.
- J. Load/Deflection: Grating shall meet manufacturer's published safe recommended loadings with deflection not to exceed the following:

Uniform distributed load over a 60" span: 50 pounds per square foot, with a maximum deflection of 0.14". NOTE: Maximum span approved by Coast Guard is 44".
- J. Gratings that will be installed outdoors in direct UV shall receive a secondarily applied UV coating based on a 2 part aliphatic polyurethane system.

- K. 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 STAIR TREADS

- A. Stair treads shall be Safe-T-Span® pultruded I6015P-T phenolic stairtreads. Construction, component part dimensions and mesh configuration shall be in accordance with Section 2.3 – PULTRUDED GRATING.
- B. Nosing shall be OSHA compliant and formed by placing two load bars together, locking into place with standard notched and epoxied tie bars. Nosing shall be coated a different color than grating so as to be readily discernable to persons when descending a stair as required by OSHA.
- C. Non-slip surface: Tread shall be provided with quartz grit, adhesively bonded and baked to the top surface of the finished tread.
- D. Load/Deflection: Treads shall meet manufacturer's published safe recommended loadings with deflection not to exceed the following:

Concentrated line load placed at the center of the stair tread over a 40" clear span: 500 pounds, with a maximum deflection of 0.16". NOTE: Maximum span approved by the Coast Guard is 44".

2.5 GRATING & TREAD FABRICATION

- A. Measurements: Grating and treads 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 sealed to provide maximum fire and 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 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.

3.2 INSTALLATION

- A. Contractor shall install gratings in accordance with manufacturer's assembly drawings. Secure grating panels 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.