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SECTION 06610 FIBERGLASS REINFORCED PLASTICS (FRP) FABRICATIONS

MOLDED AND PULTRUDED FRP GRATING

(NOTES TO SPECIFIERS: Pultruded and molded gratings are manufactured in a variety of resins in the FGM - 2003 standard configurations. Please consult your grating supplier to determine which resin system is appropriate for your environment which includes the corrosives and their concentration that the grating will come in contact with, the temperature of those corrosives and their application (splash and spill, submerged, etc.)

PART 1 - GENERAL

1.01 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 Fiberglass Grating Manual, ANSI/ASCE/ACMA FGM ____-2003

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 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 Surface Burning Characteristics of Building Materials

1.02 SUMMARY

A. This section includes shop fabricated fiberglass reinforced plastic (FRP) pultruded and molded gratings and treads.

1.03 SCOPE OF WORK

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

1.04 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, clip angles, member sizes, 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.

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1.05 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 Qualifications: Firm 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.

1.06 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. Gratings: Design live loads of the FRP gratings for walkway applications shall be 50 psf uniformly distributed load (or as required by the governing building code) with a maximum deflection of 3/8" or L/120 at the center of a simple span OR a concentrated load of 250 pounds with a maximum deflection of 1/4" at the center of a simple span.

C. Stair Treads: Stair treads shall be designed for a uniform live load of 100 psf at the center of a simple span OR a 300 pound line load at the center of the tread, whichever produces the greater stress.

1.07 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

2.01 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.

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B. Fiberglass reinforcement for molded and pultruded grating shall be continuous roving. Additionally for pultruded gratings, reinforcements shall include a combination of continuous strand mat and surfacing veils. All reinforcements shall be in sufficient quantities as needed by the application and/or physical properties required.

C. Resins shall be {VINYL ESTER *or* POLYESTER - *choose one*} with chemical formulations as necessary to provide the corrosion resistance, strength and other physical properties as required. {Consult grating manufacturer for the appropriate resin choice for your environment. Information grating manufacturer will require is defined in "**Ordering Information**" on page 22}.

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 components shall be further protected from ultraviolet (UV) light with 1) integral UV inhibitors in the resin and 2) a synthetic surfacing veil to help produce a resin rich surface.

F. All FRP products shall {be non-fire-retardant *OR* have a tested flame spread rating of 25 or less when tested in accordance with the ASTM E-84 Tunnel Test – *choose one*}.
For fire retardant gratings, ADD:

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 of material supplied on the project. Test data performed only on the base resin shall not be acceptable.

G. All grating clips shall be manufactured of {Type 316SS *or* 304 SS *or* 18-8 SS *or* galvanized steel *or* Monel – *choose one based on your corrosive environment*}

H. After fabrication, all cut ends, holes and abrasions of FRP grating shall be sealed with a resin comparable to the grating panel.

I. Manufacturers:

1. American Grating – (800) 266-2258 or (626) 855-1777
2. Creative Pultrusions – (888) 274-7855 or (814) 839-4186
3. Fibergate Composite Structures Inc. – (800) 527-4043 or (972) 250-1633
4. IKG Industries – (800) 835-8356 or (713) 378-3924
5. Precisioneering - 800-465-1800 or (416) 751-9200
6. Strongwell - (276) 645-8103
7. FRP Grating (650) 372-9968
8. Or approved alternative manufacturer

2.02 MOLDED GRATING & TREADS

A. GENERAL

1. Manufacture: Grating shall be of a one piece molded construction with tops and bottoms of bearing bars and cross bars in the same plane. Grating shall have a {square mesh pattern providing bidirectional strength *or* rectangular mesh pattern – *choose one*}. Grating shall be reinforced with continuous rovings of equal number of layers in each direction. The top layer of reinforcement shall be no more than 3/16" below the top surface of the grating so as to provide maximum stiffness and prevent resin chipping of unreinforced surfaces. Percentage of glass (by weight) shall not exceed 40% so as to achieve maximum corrosion resistance, and as required to maintain the structural requirements of the CONTRACT.

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2. After molding, no dry glass fibers shall be visible on any surface of bearing bars or cross bars. All bars shall be smooth and uniform with no evidence of fiber orientation irregularities, interlaminar voids, porosity, resin rich or resin starved areas.
3. Non-slip surfacing: Grating shall be manufactured with a concave profile on the top of each bar providing maximum slip resistance. Secondarily applied grit shall be allowed as long as the top surface does not exceed 1/16". Grit molded integrally during the manufacturing process shall be allowed, with the top surface not exceeding 3/16".
4. Color: {Gray or Yellow or Green or Orange—consult the manufacturer for standard colors}
5. Grating configuration shall be {choose those applicable for project}
 - 1" deep, 1-1/2" SM
 - 1" deep, 1" x 4" RM
 - 1-1/2" deep, 1-1/2" SM
 - 2" deep, 2" SM
6. 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.

2.03 PULTRUDED GRATING & TREADS

A. GENERAL

1. Manufacture: Grating components shall be manufactured by the pultrusion process, shall be of high strength and high stiffness elements having a maximum of 70% and a minimum of 65% 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.
2. Grating bearing bars shall be joined into panels, interlocked and epoxied into the proper spacing by passing a continuous, notched cross rod or cross rods through the web of each bearing bar. The notches shall be spaced on centers to match the distance between the load bars. A continuous keeper shall be driven behind the notched cross rod to affix it into place. Chemical bonding shall complete the assembly of the cross bar system to ensure both a mechanical and chemical lock.
3. Non-slip surfacing: Grating shall be provided with a grit bonded to the top surface of the finished grating product.
4. Color: Gray or Yellow.
5. Grating configuration shall be {choose those applicable}

1" deep I-60	1" deep I-40
1-1/2" deep I-60	1-1/2" deep I-40
2" deep T-50	2" deep T-33
6. 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.

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2.04 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. 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 a resin comparable to grating 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: 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

3.01 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.

3.02 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.

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.

*** END OF SPECIFICATION ***