

Strongwell Specifications

Section 06600

Fiberglass Reinforced Plastic Products and Fabrications

SECTION 06600

FIBERGLASS REINFORCED PLASTIC PRODUCTS AND FABRICATIONS

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 work of this section.

1.02 SUMMARY:

- A. This section includes the following FRP Products & Fabrications:
 - 1. FRP Stairs and Treads
 - 2. FRP Gratings and Frames
 - 3. FRP Structural Shapes
 - 4. FRP Handrails
 - 5. FRP Ladders & Cages
 - 6. FRP Foam Cored Building Panels

1.03 SCOPE OF WORK:

- A. Furnish all labor, materials, equipment and incidentals necessary to install the fiberglass reinforced plastic (FRP) products as specified herein.

1.04 QUALITY ASSURANCE:

- A. The material covered by these specifications shall be furnished by a reputable and qualified manufacturer of proven ability who has regularly engaged in the manufacture and installation of FRP systems.
- B. Substitution of any component or modification of system shall be made only 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.

1.05 DESIGN CRITERIA:

- A. The design of FRP products including connections shall be in accordance with governing building codes and standards as applicable.
- B. Design of FRP live loads on grating shall not be less than 100 pounds per sq. ft. Grating deflection at the center of a simple span not to exceed .25 inch.

- C. Structural members shall be designed to support all applied loads. Deflection in any direction shall not be more than $L/180$ of span for structural members. Connections shall be designed to transfer the loads.

1.06 SUBMITTALS:

- A. Shop drawings of all FRP structural members, handrails, gratings, plate, ladders and appurtenances shall be submitted to the Engineer for approval in accordance with the requirements of Section 01340.
- B. Manufacturer's catalog data showing:
 - 1. Dimensions, spacings, and construction of grating
 - 2. Design tables showing limits for span length and deflection under various uniform and concentrated loads
 - 3. Materials of construction
- C. Detail shop drawings showing:
 - 1. Dimensions
 - 2. Sectional assembly
 - 3. Location and identification mark
 - 4. Size and type of supporting frames required
- D. Samples of each type of product proposed shall be submitted for approval prior to placement of purchase orders.

1.07 SHIPPING AND STORAGE INSTRUCTIONS:

- A. All systems, sub-systems and structures shall be shop fabricated and assembled into the largest practical size suitable for transporting.
- B. All materials and equipment necessary for the fabrication and installation of the grating, plate, handrails, stair treads, structural shapes and building panels shall be stored before, during, and after shipment in a manner to prevent cracking, twisting, bending, breaking, chipping or damage of any kind to the materials or equipment, including damage due to over exposure to the sun. Any material which, in the opinion of the Engineer, has become damaged as to be unfit for use, shall be promptly removed from the site of work, and the Contractor shall receive no compensation for the damaged material or its removal.
- C. Identify and match-mark all materials, items, and fabrications for installation and field assembly.

PART 2 - PRODUCTS

2.01 GENERAL:

- A. Materials used in the manufacture of the FRP products shall be new stock of the best quality and shall be free from all defects and imperfections that might affect the performance of the finished product.

- B. All materials shall be of the kind and quality specified, and where the quality is not specified, it shall be the best of the respective kinds and suitable for the purpose intended.
- C. All FRP products noted in 1.02 shall be manufactured using a pultruded process utilizing either an isophthalic polyester or a vinyl ester resin with flame retardant and ultraviolet (UV) inhibitor additives. A synthetic surface veil shall be the outermost layer covering the exterior surface. The FRP shapes shall achieve a flame spread of 25 or less in accordance with ASTM test method E-84. (Isophthalic polyester resin is available without flame retardant and UV inhibitor additives.)
- D. After fabrication, all cut ends, holes and abrasions of FRP shapes shall be sealed with a compatible resin coating to prevent intrusion of moisture.
- E. FRP products exposed to weather shall contain an ultraviolet inhibitor. Should additional ultraviolet protection be required, a one mil minimum U.V. coating can be applied.
- F. All exposed surfaces shall be smooth and true to form.
- G. Manufacturers:
 - 1. Strongwell
 - 2. Or approved alternative manufacturer

2.02 GRATINGS AND TREADS:

A. General

- 1. Grating shall be shipped from the manufacturer, palletized and banded with exposed edges protected by cardboard to prevent damage in shipment.
- 2. Each piece shall be clearly marked showing manufacturer's applicable drawing number.
- 3. Grating shall be DURADEK® or DURAGRID® as manufactured by Strongwell-Chatfield Division, Chatfield, MN.

B. Design

- 1. The panels shall be _____ inches deep and sustain a deflection of no more than .25 inches under a uniform distributed load of 100 psf for the span lengths shown on the plans.
- 2. The bearing bars shall be joined into panels by passing continuous length fiberglass pultruded cross rods through the web of each bearing bar. The pultruded cross rod assembly shall consist of two cross rod spacers that have notches cut into them at _____ inches on center to fit the distance between the web of each bearing bar. A continuous fiberglass pultruded bar shaped section shall be wedged between the two cross rod spacers mechanically locking the notches in

the cross rod spacers to the web of the bearing bars. Continuous chemical bonding shall be achieved between the cross rod spacers and the bearing web and between the bar shaped wedge and the two cross rod spacers locking the entire panel together to give a panel that resists twist and prevents internal movement of the bearing bars.

3. Stair treads shall be capable of withstanding a uniform load of 100 lbs. per sq. ft. or a concentrated load of 300 lbs. on an area of 4 sq. inches located in the center of the tread, whichever produces the greater stress.
4. The top surface of all panels shall have a non-skid grit affixed to the surface by an epoxy resin followed by a top coat of epoxy resin.
5. Panels shall be fabricated to the sizes shown on the drawings.

PICK ONE

6. Hold down clamps shall be type 316L stainless steel saddle clips. A minimum of 4 each per panel.

- or -

Hold down clamps shall be type 316L stainless steel insert hold downs as provided by Strongwell-Chatfield Division. A minimum of 4 each per panel.

PICK ONE

7. Color shall be high visibility yellow.

- or -

Color shall be gray.

OPTIONAL

8. All bearing bars that are to be exposed to UV shall be coated with polyurethane coating of a minimum thickness of 1 mil.

C. Products

1. The FRP grating and stair treads shall be fabricated from bearing bars and cross rod manufactured by the pultrusion process. The bearing bars shall be ____ inch deep with a ____ inch wide top flange, a ____ inch wide bottom flange and a web thickness of ____ inch. The glass fiber reinforcement for the bearing bars shall be a core of continuous glass strand rovings wrapped with continuous strand glass mat. A synthetic surface veil shall be the outermost layer covering the exterior surfaces.
2. Fiberglass Grating and Stair Treads
 - a) Fiberglass grating and stair treads shall be made from a premium grade chemical resistant, fire retardant vinyl ester resin system with antimony trioxide added to meet the flame rating of 25 or less in accordance with ASTM E-84 testing and meet the self-extinguishing requirements of ASTM D-635. U. V. inhibitors are added to the resin.

3. Grating with SAFPLATE™
 - a) Grating shall be the same as described above in this section.
 - b) SAFPLATE™ shall be EXTREN® as manufactured by Strongwell-Bristol Division, Bristol, VA
 - c) SAFPLATE™ shall be manufactured using a premium grade polyester or vinyl ester resin with fire retardant additive to meet Class 1 flame rating of 25 or less as tested by ASTM E-84 and meet the self-extinguishing requirements of ASTM D-635. All plate shall contain a U. V. inhibitor. See Note 1.
 - d) SAFPLATE™ shall be epoxy bonded to the grating, and a non-skid grit shall be affixed to the top surface of the assembly by epoxy resin, followed by a top coat of epoxy resin.
4. All cut and machined edges, holes and abrasions shall be sealed with a resin compatible with the resin matrix used in the bearing bars and cross rods.
5. All panels shall be fabricated to the sizes shown on the approved shop drawing.

2.03 STRUCTURAL SHAPES AND PLATE:

A. Material

1. Structural shapes and plate shall be made from a premium grade polyester or vinyl ester resin with fire retardant additives to meet Class 1 flame rating of ASTM E-84 and meet the self-extinguishing requirements of ASTM D-635. All structural shapes shall contain a U.V. inhibitor. See Note 1.

B. Process

1. Manufactured by the pultrusion process.
2. Structural FRP members composition shall consist of a glass fiber reinforced polyester or vinyl ester resin matrix, approximately 50% resin to glass ratio. A synthetic surface veil shall be the outermost layer covering the exterior surfaces. Glass strand rovings shall be used internally for longitudinal strength. Continuous strand glass mats shall be used internally for transverse strength.

Note 1: 500 Series - Isophthalic Polyester without flame retardant or UV inhibitor additives available on request.

3. The following minimum mechanical properties shall apply:

**Table 1 - Fiberglass Pultruded Material Properties
Minimum Ultimate Coupon Properties (UN)**

PROPERTIES	TEST METHOD ⑦	UNITS/ VALUE	SERIES	SERIES	SERIES 500/525 PLATE ⑤			SERIES 625 PLATE ⑤		
			500/525 SHAPES	625 SHAPES	1/8"	3/16"-1/4"	3/8"-1"	1/8"	3/16"-1/4"	3/8"-1"
MECHANICAL										
Tensile Stress, LW	D638	psi MPa	30,000 207	30,000 207	20,000 138	20,000 138	20,000 138	20,000 138	20,000 138	20,000 138
Tensile Stress, CW	D638	psi MPa	7,000 48	7,000 48	7,500 51	10,000 68	10,000 68	7,500 51	10,000 68	10,000 68
Tensile Modulus, LW	D638	10 ⁶ psi MPa	2.5 17250	2.6 17940	1.8 12420	1.8 12420	1.8 12420	1.8 12420	1.8 12420	1.8 12420
Tensile Modulus, CW	D638	10 ⁶ psi MPa	.8 5520	.8 5520	.7 4830	.9 6210	1.4 9660	1 6900	1 6900	1.4 9660
Compressive Stress, LW	D695	psi MPa	30,000 207	30,000 207	24,000 165	24,000 165	24,000 165	24,000 165	24,000 165	24,000 165
Compressive Stress, CW	D695	psi MPa	15,000 103	16,000 109	15,500 106	16,500 113	20,000 137	16,500 113	17,500 120	17,500 120
Compressive Modulus, LW	D695	10 ⁶ psi MPa	2.5 17250	2.6 17940	1.8 12420	1.8 12420	1.8 12420	1.8 12420	1.8 12420	1.8 12420
Compressive Modulus, CW	D695	10 ⁶ psi MPa	1 6900	1 6900	1 6900	1 6900	1 6900	1 6900	1 6900	1 6900
Flexural Stress, LW	D790	psi MPa	30,000 207	30,000 207	35,000 241	35,000 241	30,000 207	35,000 241	35,000 241	30,000 207
Flexural Stress, CW	D790	psi MPa	10,000 69	10,000 69	13,000 89	15,000 103	18,000 124	13,000 89	15,000 103	18,000 124
Flexural Modulus, LW	D790	10 ⁶ psi MPa	1.6 11040	1.6 11040	1.8 12420	2 13800	2 13800	1.8 12420	2 13800	2 13800
Flexural Modulus, CW	D790	10 ⁶ psi MPa	.8 5520	.8 5520	.9 6210	1.1 7590	1.4 9660	1 6900	1.1 7590	1.4 9660
Modulus of Elasticity, Ex or Ey ①	full section	10 ⁶ psi MPa	2.6 17940	2.8 19320						
Compressive Shear Stress, LW ②	D3846	psi MPa	3,000 20	3,000 20						
Shear Modulus, LW ③ (Nominal)		10 ⁶ psi MPa	.425 2932	.425 2932						
Short Beam Shear, LW	D2344	psi MPa	4,500 31	4,500 31						
Bearing Stress, LW	D953	psi MPa	30,000 207	30,000 207	32,000 220	32,000 220	32,000 220	32,000 220	32,000 220	32,000 220
Bearing Stress, CW	D953	psi MPa			32,000 220	32,000 220	32,000 220	32,000 220	32,000 220	32,000 220
Poisson's Ratio, LW (Nominal)	D3039		.33	.33	.31	.31	.31	.32	.32	.32
Notched Izod Impact, LW	D256	ft-lbs/in N*m/m	25 1334	25 1334	18.5 987	20 1067	20 1067	18.5 987	20 1067	20 1067
Notched Izod Impact, CW	D256	ft-lbs/in N*m/m	4 213	4 213	5 266	5 266	5 266	5 266	5 266	5 266

**Table 1 - Fiberglass Pultruded Material Properties
Minimum Ultimate Coupon Properties (UN) - cont'd**

PROPERTIES	TEST METHOD ^⑦	UNITS/ VALUE	SERIES	SERIES	SERIES 500/525 PLATE ^⑤			SERIES 625 PLATE ^⑤		
			500/525 SHAPES	625 SHAPES	1/8"	3/16"-1/4"	3/8" - 1"	1/8"	3/16"-1/4"	3/8"-1"
PHYSICAL										
Barcol Hardness	D253		45 ^④	45 ^④	40	40	40	40	40	40
24 HR Water Absorption	D570	% Max by wt	.6	.6	.6	.6	.6	.6	.6	.6
Density	D792	lbs/in ³ kg/m ³	.062-.070 1716-1937	.062-.070 1716-1937	.060-.068 1660-1882	.060-.068 1660-1882	.060-.068 1660-1882	.060-.068 1660-1882	.060-.068 1660-1882	.060-.068 1660-1882
Coefficient of Thermal Expansion (Nominal)	D696	10 ⁻⁶ in/in/°F 10 ⁻⁶ m/m/°C	4.4 8	4.4 8	8.0 4.4	8.0 4.4	8.0 4.4	8.0 4.4	8.0 4.4	8.0 4.4
Thermal Conductivity (Nominal)	C177	BTU-in/ ft ² /Hr/°F w/(m *k)	4 .58	4 .63						
ELECTRICAL										
Dielectric Strength, LW	D149	KV/in	35	35	35	35	35	35	35	35
Dielectric Strength, PF	D149	volts/mil	200	200	200	N.T.	N.T.	250	N.T.	N.T.
Volume Resistivity (Nominal)	D257	ohms-cm	1x10 ¹³	1x10 ¹³	1x10 ¹³	1x10 ¹³	1x10 ¹³	1x10 ¹³	1x10 ¹³	1x10 ¹³
FLAMMABILITY ^⑥										
Flammability Classification (1/16")	UL94	VO								
Tunnel Test	E-84	25 Max								
NBS Smoke Chamber	E-662	650-700 (typical)								
Flammability	D635	Self Extinguishing								
UL Thermal Index	Generic	130° C								
British Fire Test	BS 476-7	Class 1								

All values are minimum ultimate properties from coupon tests except as noted.

- ① This value is determined from full section simple beam bending of EXTREN® structural shapes.
- ② The shear stress test results will change radically if the notch orientation is altered. The value in this chart represents the test configuration where the notches are machined parallel to the reinforcing mat. For notches machined perpendicular to the reinforcing mat, this value would be three times larger.
- ③ The Shear Modulus value has been determined from tests with full sections of EXTREN® structural shapes. (See Strongwell's EXTREN® *Design Manual* for further information.)
- ④ Value would be 50 if the surfacing veil were not there.
- ⑤ Plate compressive stress/modulus measured edgewise and flexural stress/modulus measured flatwise.
- ⑥ Values apply to Series 525 and 625.
- ⑦ All listings beginning with a 'D' or 'E' are ASTM tests.

LW = Lengthwise or parallel to the rovings
 CW = Crosswise or perpendicular to laminate face
 MPa = Megapascals

PF = Tested perpendicular to laminate face
 N.T. = Not Tested

2.04 HANDRAILS:

A. Design

1. The FRP handrail system shall be designed to meet the configuration and loading requirements of OSHA 1910.23, with a minimum factor of safety on loading of 2.0.

B. Material

1. The rails and posts shall be 2" x 2" x .156" square tube manufactured by the pultrusion process. The kickplate shall be 4" x 1/2" (corrugated) x .125" thick pultruded fiberglass shape. The parts shall be coated with an industrial grade polyurethane paint for additional U.V. protection and wear resistance. The pultruded parts shall be made with a fire retardant resin which meets the ASTM E-84 test for a flame spread of 25 or less. The resin matrix shall be vinyl ester and shall contain a U.V. inhibitor. The color shall be [high visibility yellow] or [gray].
2. The pultruded parts shall meet the following minimum mechanical properties:

PROPERTIES	TEST METHOD	UNITS	VALUES
Tensile Stress	ASTM D638	psi MPa	30,000 207
Tensile Modulus	ASTM D638	10 ⁶ psi MPa	2.5 17,250
Compressive Stress	ASTM D695	psi MPa	30,000 207
Compressive Modulus	ASTM D695	10 ⁶ psi MPa	2.5 17,250
Flexural Stress	ASTM D790	psi MPa	30,000 207
Flexural Modulus	ASTM D790	10 ⁶ psi MPa	1.6 11,040
Shear Stress	ASTM D2344	psi MPa	4,500 31
Density	ASTM D792	lbs/in ³ kg/m ³	.060-.070 1660-1930
24 hr. Water Absorption	ASTM D570	% max by wt.	.6%
Coef. of Thermal Expansion (Nominal)	ASTM D696	10 ⁻⁶ in/in/F ^o 10 ⁻⁶ m/m/C ^o	4.4 2.44
Flexural Stress	Full Section	psi MPa	36,000 248
Flexural Modulus	Full Section	10 ⁶ psi MPa	3.7 25,530

C. Fabrication of Handrail System

1. The fiberglass handrail system shall be fabricated into finished sections by fabricating and joining together the pultruded square tube using molded or pultruded components; epoxy bonded and connected as shown in the fabrication details. Where required by OSHA, fiberglass kickplate shall be attached to the handrail posts with nylon rivets. Handrail sections shall be fabricated to the size shown on the approved fabrication drawings and shall be piece marked with a water proof tag.

D. For Side Mount

1. Post shall be constructed with a square pultruded bottom plug. Length shall be sufficient to extend a minimum of 1 inch beyond the uppermost bolt hole to prevent crushing of post tubing. Bolt holes shall provide clearance of 1/16 inch for 1/2 inch diameter bolts/studs. Holes shall be on longitudinal center line of post, 1 inch from bottom of post (minimum) and not less than 3 inches apart on center. Posts shall be fastened with stainless steel anchor bolts or studs, 1/2 inch diameter extending no less than 2-1/4 inches into the concrete, or into a minimum thickness of 1/4 inch structural steel or pultruded fiberglass.
2. Post locations shall be no greater than 18 inches, nor less than 9 inches from horizontal or vertical change in handrail direction. Post centers shall be no greater than 72 inches apart on any straight run of rail, or 48 inches apart on any inclined rail section.

E. Other Attachment Methods

1. Base mount, embedded, and removable are also types of mounting procedures for handrail. Contact approved fabricator for detailed information on these connection types.

F. Installation of Handrail Sections

1. The fabricated handrail sections shall be supplied complete with fittings by the FRP manufacturer. The components used to join fabricated sections together may be shipped loose, to be epoxied and riveted together in the field by the contractor, per the manufacturer's recommendations.
2. The fabricated handrail sections shall be installed as shown on the approved shop drawings. The handrail sections shall be accurately located, erected plumb and level. The sections shall be fastened to the structure as shown on the shop drawing.

G. Approved Fabricators

1. Strongwell
 - a) Chatfield Division (Chatfield, MN)
 - b) Bristol Division (Bristol, VA)
2. Or approved alternative manufacturer

2.05 FIBERGLASS REINFORCED PLASTIC (FRP) LADDERS AND CAGES:

A. Performance Requirements

1. Ladder and cage systems shall meet the requirements set forth in OSHA 1910.27. The ladder shall also be capable of supporting a concentrated vertical load of 1200 pounds applied at the mid-span of the rung.

B. Materials

1. The side rails and cage straps shall be fiberglass reinforced pultruded (isophthalic polyester) or (vinyl ester) with OSHA safety yellow pigment. An industrial grade polyurethane yellow coating shall be applied to the finished ladder and cage.
2. The side rails shall be 2" square tube with a wall thickness of .156" or greater. The rungs shall be 1" diameter rod with a pigmented epoxy, non-skid grit surface.
3. Cage hoops shall be manufactured by the open mold hand lay-up process with a width of 3" and thickness of 1/4" minimum at the top and bottom and 2"x1/4" at the intermediate hoops. The cage shall be interconnected with 2" x 3/16" pultruded straps spaced 9" on center around the hoop.
4. Fiberglass pultruded rails, cage straps, solid rod and cage hoops to be manufactured by Strongwell.

C. Fabrication Requirements

1. All joints and rungs shall be epoxied and riveted. The hoops shall be attached to the rails in a manner which provides hand clearance throughout the length of the ladder.
2. Ladders shall be shop assembled, and may be pre-drilled and prepared for field attachments of standoff clips.
3. The ladder cages shall be shipped assembled or may be pre-drilled for field assembly using rivets.

D. Workmanship

1. All cut or machined edges, holes and abrasions shall be sealed with a resin compatible with the resin matrix used in the structural shape.

E. Approved Fabricators

1. Strongwell
 - a) Chatfield Division (Chatfield, MN)
 - b) Bristol Division (Bristol, VA)
2. Or approved alternative manufacturer

F. Installation

1. All FRP ladder sections shall be installed as shown on the approved shop drawings.

2.06 FIBERGLASS REINFORCED PLASTIC (FRP) FOAM CORED BUILDING PANELS:

A. Materials

1. Each panel shall be manufactured using a pultruded process utilizing either an isophthalic polyester or a vinyl ester resin with flame retardant and ultra-violet (UV) inhibitor additives. A synthetic surface veil shall be the outermost layer covering the exterior surface. The FRP panel shall achieve a flame spread of 25 or less in accordance with ASTM test method E-84. Each panel will consist of an outer pultruded FRP skin with a rigid foam core having an approximate "R" factor of "7" per inch of panel thickness.
2. Exposed foam cored panel ends shall be encapsulated with FRP pultruded materials or must be sealed with a resin compatible with the resin matrix used in the pultruded FRP portion of the panel itself.

3. The following mechanical and physical properties shall apply:

Mechanical Property	Units	1" Panel	3" Panel
Flexural Strength	psi MPa	1,750 12	869 6
Flexural Modulus	10 ⁶ psi MPa	.2 1379	.17 1172
Short Beam Shear	psi MPa	113 .77	90 .62
Coef. of Thermal Exp (nominal)	10 ⁻⁶ in/in/F ^o 10 ⁻⁶ m/m/C ^o	5.2 2.9	5.2 2.9
Pullout Test (Pull Through)			
• Std. Washer (1" dia. w/3/8" hole)	lbs.	650	730
• Fender Washer (2" dia. w/1/2" hole)	lbs.	1,300	1,620
Crush Test (6" x 6" Load Plate)	lbs.	5,600	6,750
Crush Test (Full Width)			
• 1" dia. Bar	lbs.	5,200	
• 2-1/2" dia. Bar	lbs.		18,800
Physical Property			
Weight	lbs./linear ft.	1.99	7.85
Panel Width	in.	12	24
"R" Factor (Approximate)		7	21
Foam Density (Maximum)	#/cu. ft. kg/m ³	4 64	4 64
Flame Spread Rating			
• Fiberglass Composite Skin		Max. 25	Max. 25
• Foam		Max. 25	Max. 25

4. Fiberglass pultruded foam cored DURASHIELD® panels to be manufactured by Strongwell-Bristol Division, Bristol, VA.

B. Connections

1. Panels will be designed for tongue-in-groove joint connections on two parallel sides per panel.
2. The panels can be fastened to the super structure with epoxy adhesive and/or stainless steel or fiberglass fasteners.

C. Approved Fabricators

1. Strongwell
 - a) Chatfield Division (Chatfield, MN)
 - b) Bristol Division (Bristol, VA)
2. Or approved alternative manufacturer

PART 3 - EXECUTION

3.01 PREPARATION:

- A. Coordinate and furnish anchorages, setting drawings, diagrams, templates, instructions and directions for installation of anchorages, including concrete inserts, sleeves, anchor bolts and miscellaneous items having integral anchors that are to be embedded in concrete or masonry construction. Coordinate delivery of such items to project site.
- B. Set sleeves in concrete with tops flush with finish surface elevations; protect sleeves from water and concrete entry.

3.02 INSPECTION AND TESTING:

- A. The Engineer shall have the right to inspect and test all materials to be furnished under these specifications prior to their shipment from the point of manufacture.
- B. All labor, power, materials, equipment and appurtenances required for testing shall be furnished by the Contractor at no cost to the Owner.

3.03 INSTALLATION, GENERAL:

- A. Fastening to in-place construction: Provide anchorage devices and fasteners where necessary for securing miscellaneous FRP fabrications to in-place construction; include threaded fasteners for concrete and masonry inserts, toggle bolts, through-bolts, lag bolts and other connectors as required.
- B. Cutting, fitting and placement: Perform cutting, drilling and fitting required for installation of miscellaneous FRP fabrications. Set FRP fabrication accurately in location, alignment and elevation; with edges and surfaces level, plumb, true and free of rack; and measured from established lines and levels.
- C. Provide temporary bracing or anchors in form work for items that are to be built into concrete masonry or similar construction.

3.04 ALL FRP INSTALLATION:

- A. All field cut and drilled edges, holes and abrasions shall be sealed with a catalyzed resin compatible with the original resin as recommended by the manufacturer. The sealing of the edges shall prevent premature fraying at the field cut edges.
- B. Install items specified as indicated and in accordance with manufacturer's instructions.

End of Section 06600



STRONGWELL

ISO-9001 Certified Manufacturing Plants

BRISTOL DIVISION

400 Commonwealth Ave., P. O. Box 580, Bristol, VA 24203-0580 USA
(540) 645-8000 FAX (540) 645-8132

CHATFIELD DIVISION

1610 Highway 52 South, Chatfield, MN 55923-9799 USA
(507) 867-3479 FAX (507) 867-4031

www.strongwell.com