FRP Specifications

Section 06 70 00
Fiberglass Reinforced Polymer (FRP) Foam Core Building Panels and Fabrications

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FIBERGLASS REINFORCED POLYMER (FRP) 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 FRP Products & Fabrications for FRP Foam Core Building Panels.

1.03 SCOPE OF WORK:

A. Furnish all labor, materials, equipment and incidentals governed by this section necessary to install the fiberglass reinforced polymer (FRP) products as specified herein.

1.04 QUALITY ASSURANCE:

A. The material covered by these specifications shall be furnished by an ISO-9001 certified manufacturer of proven ability who is regularly engaged in the manufacture, fabrication and installation of FRP systems.

B. Substitution of any component or modification of system shall be made only when approved by the Architect or Design 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 DURASHIELD® fiberglass foam core panels, the fiberglass support structure, and associated structural connections, shall be in accordance with the governing building code(s), the Strongwell Design Manual, and approved standards as applicable.

B. Design live loads shall be in accordance with the governing building code as follows:
Wall Panels shall be designed for the following wind load conditions using the methods in ASCE 7:
Wind Velocity _____ (example: 85 mph)
Exposure _____ (example: Exposure C)
Wind Importance Factor _____ (example: Iw = 1.0)
Maximum Deflection _____ (example: L/180)
Roof Panels shall be designed for the following load conditions using the methods in ASCE 7 (the effect of ponding shall be considered):
Design Snow Load _____ (example: 20 psf)
Design Rain Load _____ (example: 15 psf)
Design Live Load _____ (example: 20 psf)
Maximum Deflection _____ (example: L/240)
Floor Panels shall be designed for the following load conditions using the methods in ASCE 7:
Design Live Load _____ (example: 60 psf for elevated walking surfaces that are not an emergency egress route)
Maximum Deflection _____ (example: lesser of L/240 or 0.25”)

C. Design the foam core panels and support structure in accordance with the Strongwell Design Manual for in-service temperatures of _____ degrees Fahrenheit (example: 125 degrees) with ultimate stress retention of_____ (example: 85% for 125 degrees) and a modulus of elasticity retention of _____ (example: 90% for 125 degrees).

D. Structural support members shall be designed to support the design loads with a total load deflection not exceeding _____ (example: L/240) of the structural member span length.

E. Structural connections shall be designed to transfer the design loads.

F. Reinforce and stiffen penetrations in foam core panels in accordance with the manufacturer’s recommendations.

1.06 SUBMITTALS:

A. Shop drawings of all fabricated foam core building panels shall be submitted to the Design Engineer for approval in accordance with the requirements of Section _____. Fabrication shall not start until receipt of Design Engineer's approval marked "Approved As Submitted" or "Approved As Noted".

B. Manufacturer's catalog data showing:
   1. Materials of construction
   2. Dimensions, spacings, and construction of foam core building panels.

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 shall be submitted for approval in accordance with the requirements of Section _____.

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 foam core building panels and appurtenances 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 Design 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 raw materials in conformance with the specification and certified as meeting the manufacturer's approved list of raw materials.

B. All raw materials shall be as specified by the contract.

C. The visual quality of the pultruded shapes shall conform to ASTM D4385.

D. All foam core building panels shall be manufactured using a pultruded process utilizing _____ (select polyester or vinyl ester) resin with flame retardant and ultraviolet (UV) inhibitor additives. A minimum 7 mil synthetic surface veil fabric shall encase the glass reinforcement. FRP shapes shall achieve a flame spread rating of 25 or less in accordance with ASTM test method E-84, the flammability characteristics of UL 94 V0 and the self-extinguishing requirements of ASTM D635. (Polyester resin is available without flame retardant and UV inhibitor additives.)

E. If required, after fabrication, all cut ends, holes and abrasions of FRP shapes shall be sealed with a compatible resin coating.

F. FRP products exposed to weather shall contain an ultraviolet inhibitor. Should additional ultraviolet protection be required, a one mil minimum UV coating can be applied.

G. All exposed surfaces shall be smooth and true to form, consistent with ASTM D4385.

H. Manufacturers:

1. Strongwell

I. Pultruded FRP products shall be manufactured and fabricated in the USA. Manufacturer shall provide a written Certificate of Compliance.

J. The materials covered by these specifications shall be furnished by an ISO-9001 certified manufacturer.

2.02 FRP FOAM CORE BUILDING PANELS:

A. Materials

1. Each panel shall be manufactured using a pultruded process utilizing _____ (select premium polyester or vinyl ester) resin with flame retardant and UV inhibitor additives. A synthetic surface veil shall be the outermost layer covering the exterior surface. The FRP panel shall achieve a flame spread rating of 25 or less in accordance with ASTM test method E-84.

2. Exposed foam core panel ends as an option may be encapsulated with FRP pultruded materials. If required, the ends of the panels must be encapsulated or coated with a resin similar to the skin resin to maintain the corrosion and weather resistant qualities of the total panel.

3. Mechanical and physical properties shall meet or exceed the values listed in Table 3.

Table 3-Foam Core Building Panel Properties (nominal)

Mechanical Property (Nominal)	Units	1" Panel 25.4 mm	3" Panel 76.2 mm
Flexural Strength	psi	1,750	869
	N/mm^2	12.07	6
Flexural Modulus	10^6 psi	.2	.17
	10^3 N/mm^2	1.38	1.17
Short Beam Shear	psi	113	90
	N/mm^2	0.78	0.62
Pullout Test (Pull Through)			
* Std. Washer (1" dia. w/3/8" hole)	lbs	650	730
(25.4 mm dia. w/9.525 mm hole)	N	2,890	3,245
* Fender Washer (2" dia. w/ 1/2" hole)	lbs	1,300	1,620
(50.8 mm dia. w/ 12.7 mm hole)	N	5,785	7,209
Crush Test (6" x 6" Load Plate)	lbs	5,600	6,750
(152.4 mm x 152.4 mm)	N	24,920	30,037
Crush Test (Full Width)			
* 1" dia. Bar	lbs	5,200	
(25.4 mm dia. Bar)	N	23,140	
* 2-1/2" dia. Bar	lbs		18,800
(63.5 mm dia Bar)	N		83,660

Table 3-Foam Core Building Panel Properties (nominal) – cont'd

Physical Property (Nominal)	Units	1" Panel 25.4 mm	3" Panel 76.2 mm
Weight	lbs/linear ft (kg/lin. m)	1.99 (2.96)	7.85 (11.68)
Panel Width	in. (mm)	12 (304.8)	24 (609.6)
"R" Factor		5	17
Coefficient of Thermal Expansion*	10^{-6} in/in/^{o}F	5.2	5.2
	10^{-6} mm/mm/^{o}C	9.36	9.36
Foam Density	#/cu. Ft (kg/m^3)	4 (64.1)	4 (64.1)
Flame Spread Rating			
* Fiberglass Composite Skin		Max. 25	Max. 25
* Foam		Max. 25	Max. 25

* Typical Values

4. Fiberglass pultruded foam core DURASHIELD® panels to be manufactured by Strongwell.

B. Connections

1. Panels will be designed for tongue-in-groove joint connections.

2. The panels are to be fastened to the super structure with stainless steel or fiberglass fasteners as shown on the approved shop drawings.

C. Approved Manufacturers

1. Strongwell

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.

B. Coordinate delivery of such items to project site.

3.02 INSPECTION AND TESTING:

A. The Design 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 determined by the Design Engineer.

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; 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. If required, 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.

B. Install items specified as indicated and in accordance with manufacturer's instructions.

End of Section 06600