

# Special Specification 4120

## Fiber Reinforced Polymer (FRP) Composite Structural Shapes



### 1. DESCRIPTION

Furnish and install fiber reinforced polymer (FRP) composite structural shapes for use on miscellaneous structures in marine environments. This specification only addresses thermoplastic structural shapes, and does not address thermoset-pultruded structural shapes, nor vacuum infusion process (VIP) structural shapes.

### 2. MATERIALS

Provide thermoplastic structural shapes (TSS) which includes a thermoplastic matrix reinforced with chopped fiberglass filaments. Use polyethylene made from recycled post consumer or post industrial consumer industrial thermoplastics. Mix the polyethylene with appropriate colorants, UV inhibitors, hindered amine light stabilizers, antioxidants, and chopped fiberglass reinforcement so that the resulting product meets the requirements specified in Table 1. Use a minimum of 15% (by weight) chopped fiberglass reinforcement. Provide a thermoplastic matrix that will not corrode, rot, warp, splinter or crack. Extrude final product as one continuous piece with no joints or splices to the dimensions and tolerances shown in Table 2.

**Table 1**  
**Material Requirements**

Property	Test Method	Requirement
Density	ASTM D792	50-65 pcf
Impact Hardness	ASTM D256 Method A (Izod)	>2.0 ft-lb/in
Hardness	ASTM D2240	44-75 (Shore D)
Ultraviolet	ASTM D4329 (UA)	500 hours <10% change in Shore D Durometer Hardness
Chemical Resistance	ASTM D756 or ASTM D543	Sea Water: < 1.5% weight increase Gasoline: < 7.5% weight increase No. 2 Diesel: < 6.0% weight increase
Tensile Properties	ASTM D638	3,000 psi at break min.
Static Coefficient of Friction	ASTM D2394	0.25, wet or dry min.
Nail Withdrawal or Screw Withdrawal	ASTM D6117	250 lb (nail) min. 400 lb (screw) min.
Secant Modulus at 1% Strain	ASTM D6109	150,000 psi min.
Flexural Strength	ASTM D6109	2,500 psi min.
Compressive Strength	ASTM D6108	2,200 psi min.
Compressive Strength Perpendicular to Grain	ASTM D6108	700 psi min.

**Table 2**  
**Dimensional Tolerances**

Dimension	Tolerance
Length	0/+6 inch
Width	±1/4 inch
Height	±1/4 inch
Straightness (while lying on a flat surface)	< 1 1/2" per 10 ft

---

**3. CONSTRUCTION**

Construct structures utilizing FRP composite shapes in accordance with the plans. Ensure all framing is true and exact. Accurately cut all members, and frame so the joints have even bearing over the entire contact surfaces. Store members in piles at the worksite, as recommended by the manufacturer. Stack members at least 12 in. above the ground surface and protect from the weather. Clear the grounds of weeds and rubbish underneath and near material piles. Handle members with dropping or breaking outer fibers. Use slings or other approved equipment for handling. Use equipment that will not damage the surface of the FRP composite shapes. Provide corner protectors when using metal bands to bundle members.

---

**4. MEASUREMENT**

FRP composite shapes will be measured by the 1,000 board feet, computed on nominal sizes and the shortest commercial lengths practical for use.

---

**5. PAYMENT**

The work performed and materials furnished in accordance with this Item and measured as provided under "Measurement" will be paid for at the unit price bid for "FRP Composite Shapes (TSS)." This price is full compensation for materials, hardware, equipment, tools, labor, and incidentals.