MODULAR FIBERGLASS EQUIPMENT SHELTER

1. REFERENCE SPECIFICATIONS, CODES, AND STANDARDS
	1. ASTM D256 – Standard Test Methods for Determining the Izod Pendulum Impact Resistance of Plastics.
	2. ASTM D638 – Standard Test Method for Tensile Properties of Plastics.
	3. ASTM D790 – Standard Test Methods for Flexural Properties of Unreinforced and Reinforced Plastics and Electrical Insulating Materials.
	4. ASTM D2583 – Standard Test Method for Indentation Hardness of Rigid Plastics by Means of a Barcol Impressor.
	5. All references shall be of the latest revision.
2. SUBMITTALS
	1. Units
		1. All submittals, specifications, drawings, brochures, installation instructions, descriptive literature, etc. shall have all units of measurement in both Imperial and SI units.
	2. Drawings
		1. Project specific drawings, showing:
			1. Critical dimensions.
			2. Joints, connections, fasteners.
			3. Sizes, spacing, and locations of structural members.
			4. Materials and thicknesses of construction.
		2. Generic layouts or check marked brochures shall be rejected without review.
	3. Specifications
		1. Project specific specifications.
		2. Generic or check marked specifications shall be rejected without review.
	4. Receiving, Handling, and Storage Instructions
	5. Installation Instructions
	6. Product Warranty
	7. Test Data
		1. Independent certified test results confirming material properties.
			1. Test results are to be performed on specimens representative of the resins and reinforcements submitted upon with such resins and reinforcements listed by the certifying party.
			2. Data shall be no more than three (3) years old.
	8. Laminate Sample
		1. 6-inch [15.24 cm] square sample of representative laminate, upon request.
3. RECEIVING, HANDLING, AND STORAGE
	1. Receiving
		1. Inspect for damage
			1. All parts should be inspected upon delivery to the site, noting any missing items or visible damage.
			2. Verify that surfaces have not been damaged or otherwise marked during transit.
			3. Base and panel connection flanges should also be inspected.
			4. For smaller boxed items make sure to verify that all packaging seals are in place and that there is no visible damage to the packaging.
		2. Investigate for order correctness and count
			1. Once the order has been received review the packing list against what has been received. Should any items not appear to be present or the configuration of the items does not match the description on the packing list, contact Openchannelflow immediately.
			2. Small connection hardware (nuts, bolts, etc.) not attached to the structure ship in individual boxes – with those contents clearly marked. Special care should be taken to secure these and any other small items that can be misplaced on a job site.
	2. Handling
		1. While rugged and designed for a long service life, Modular Shelters must be handled with care.
		2. When cranes, hoists, and other machinery are used to lift factory assembled Modular Shelters or panel sections, spreader bars and lifting straps should always be used. When performing any overhead lift, all lifting eyes must be used in conjunction with good rigging practices. Rigging and lifting sequences and schedules of equipment are solely the responsibility of the installing party.
		3. Chains, ropes, and the like should never be used to move or position any structure as they may serrate the fiberglass laminate or compromise the protective gel coat surfaces.
		4. Stainless steel lifting lugs are provided at each end of factory assembled Modular Shelters and may be supplied along the length of the shelter as needed. All provided lifting lugs must be used to equalize the lifting loads.
	3. Storage
		1. Modular Shelters and panel sections not intended for immediate installation may be stored until the site is ready for their installation.
		2. Modular Shelters and panel sections should only be stored in a location that is clean, level, and protected from construction traffic.
		3. When shipped on pallets, Modular Shelters and panel sections should be left on those pallets until such time as they are needed.

1. MANUFACTURER
	1. Supply Fiberglass Equipment Shelters as manufactured by:
		1. Openchannelflow (phone: 855.481.1118 / fax: 855.3316475 / [www.openchannelflow.com)](http://www.openchannelflow.com))
			1. Locally represented by:
				1. XX
2. SUBSTITUTIONS
	1. Manufacturers wishing consideration as acceptable substitutes must follow the steps outlined below.
	2. Include a copy of this specification section with all applicable plans sheets / details, addendum updates, and all referenced / applicable sections.
	3. Each paragraph must be check marked to indicate complete compliance with the specification or clearly marked to indicate a request for deviation from the specification requirements.
		1. Use check marks (✔) to denote full compliance with a paragraph as a whole. If deviations from the specifications are indicated and, therefore requested, underline each deviation and denote by a number in the margin to the right of the identified paragraph.
		2. The remaining portions of the paragraph not underlined will signify compliance on the part of the Manufacturer with the specifications.
		3. Include a detailed, written justification for each numbered deviation.
		4. Failure to comply with the above is sufficient cause to summarily reject the entire request for substitution.
	4. Requests for substitution must be made in writing and be received by the engineer’s office a minimum of ten (10) business days before the bid opening.
	5. Manufacturers not pre-approved shall not be given consideration.
	6. To ensure strict quality control, the Manufacturer may incorporate raw materials from outside vendors, but the Manufacturer must fabricate the final product.
		1. Job shopping or outside fabrication / sourcing shall not be acceptable.
	7. In addition, the request for substitution must provide information regarding a minimum of ten (10) comparable North American installations, including:
		1. Owner’s name, location, and contact information.
		2. Application and performance specifications.
		3. Date of installation.
		4. Operational history.
		5. Equipment arrangement, including configuration and materials of construction.
3. WARRANTY
	1. Modular Shelters within the continental United States shall be warranted to be free of defects in workmanship and materials for five (5) years with a completed warranty registration.
	2. The warranty period shall begin from the date of shipment.
4. SYSTEM DESCRIPTION
	1. Configuration
		1. Size:
			1. Width:
				1. 12-feet 0-inches [3.658 m].
				2. 14-feet 0-inches [4.267 m].
				3. 16-feet 0-inches [4.877 m].
				4. 18-feet 0-inches [5.486 m].
			2. Length:
				1. \_\_\_\_\_\_\_\_\_\_-feet \_\_\_\_\_\_\_\_\_\_-inches [\_\_\_\_\_\_\_\_\_\_ m].
			3. Height (as measured at the highest point of the shelter):
				1. \_\_\_\_\_\_\_\_\_\_-feet \_\_\_\_\_\_\_\_\_\_-inches [\_\_\_\_\_\_\_\_\_\_ m].
		2. Assembly
			1. Factory assembled.
			2. Panel construction for field assembly / disassembly.
	2. Materials of Construction
		1. Fiberglass reinforced plastic laminate
			1. ISO certified polyester laminating resin:
				1. Low VOC.
				2. Properties shall meet or exceed:

Tensile Strength (ASTM D638) 12,000 psi [82.74 MPa].

Flexural Strength (ASTM D790) 23,000 psi [158.6 MPa].

Flexural Modulus (ASTM D790) 800,000 psi [5.516 GPa].

Barcol Hardness (ASTM D2583) 30.

Notched Izod (ASTM D256) 8 ft-lb/in [4.272 J/cm].

Temperature limit 150° F [65.56° C].

* + - * 1. Orthophthalic resins shall not be allowed.
			1. E-glass:
				1. Minimum of 30% of laminate content by weight.
				2. Silane coupling agent.
				3. C-glass shall not be allowed.
		1. Gel coat:
			1. All surfaces must be gel coated.
			2. 15 mil cured thickness.
			3. U.V. inhibitors in all gel coat formulations, regardless of application or installation location.
			4. Color:
				1. Interior surfaces: Alpine White.
				2. Exterior surfaces: Slate Gray.
		2. Insulating core:
			1. Rigid, unfaced, CFC / HCFC free, closed cell polyisocyanurate
				1. Properties shall meet or exceed:

Density (ASTM D1622) 2.0 lb/ft3 [32 kg/m3]

Initial R-value (ASTM C518) 6.0 Hr ft2ºF/Btu [1.06 m2ºC/W]

Compressive Strength (ASTM D1621) 27 psi [186 kPa]

Shear Strength (ASTM C273) 22 psi [151 kPa]

Tensile Strength (ASTM 1623) 41 psi [283 kPa]

Surface Burn (E84)

Flame spread <25

Smoke developed <185

* 1. Construction
		1. Molded construction utilizing X-Web technology.
		2. Laminate Schedule:
			1. Exterior gel coat:
				1. 15 mils cured.
			2. Outer laminate:
				1. 1/8-inch [0.3175 cm] thick.
			3. Outer insulating core:
				1. 1-inch [2.54 cm] thick.
			4. Center laminate:
				1. 1/16-inch [0.1588 cm] thick.
			5. Inner insulating core:
				1. 1-inch [2.54 cm] thick.
			6. Inner laminate:
				1. 1/8-inch [0.3175 cm] thick.
			7. Inner gel coat:
				1. 15 mil cured.
1. Components
	1. Doors
		1. Quantity
			1. \_\_\_\_\_ 3068 single door.
			2. \_\_\_\_\_ 3468 single door.
			3. \_\_\_\_\_ 4068 single door.
			4. \_\_\_\_\_ 6068 double door.
			5. \_\_\_\_\_ 6868 double door.
			6. \_\_\_\_\_ 8068 double door.
		2. Handedness
			1. Outswing.
			2. Left handed (LH) (outward opening, hinged on left).
			3. Right handed (RH) (outward opening, hinged on right).
		3. Door thickness shall be 1 3/4-inches [4.445 cm]
		4. Overhead door closer
			1. Aluminum finish.
			2. ANSI A156.4 Grade 1.
			3. ADA compliant / UL listed.
			4. Commercial rated.
		5. Doors shall be mounted with T-304 stainless steel surface mounted strap hinges.
			1. The use of continuous piano hinges or other fastening methods shall not be allowed.
		6. EDPM edge-grip door seals shall be applied along the full perimeter of the door opening.
			1. Edge-grip trim shall be chemically bonded to door opening.
		7. Hardware
			1. Knob lockset
				1. Stainless steel construction.
				2. Exterior keylocking (classroom style).
			2. Two-point stainless steel door hardware
				1. Exterior lever handle.
				2. Interior shall be provided with a door override and cushioned handle.
				3. Staple for user-supplied padlock.
			3. Panic hardware
				1. Stainless steel construction.
				2. Exterior key locked ball knob.
				3. Interior push bar.
		8. Integral door threshold 1/2-inch [1.27 cm] high.
	2. Lifting Lugs
		1. T-304 stainless steel lifting mounts shall be provided as shown.
		2. Lugs shall be fabricated from 1/4-inch [0.635 cm] thick sheet stock and shall have a minimum eye opening of 4-inches [10.16 cm].
	3. Connection Flanges
		1. Each end and center panel sections shall be provided with integrally molded section connection flanges.
			1. 4-inches [10.16 cm] wide
				1. Measured from the interior laminate surface to the end of the flange.
			2. 1/4-inch [0.635 cm] thick.
			3. Pre-drilled every 12 to 24-inches [30.48 to 60.96 cm] on center for 3/8-inch [0.9525 cm] T-304 stainless steel hardware.
	4. Mounting Flanges
		1. Each end and center panel sections shall be provided with an integrally molded base mounting flange.
			1. 3-inches [7.62 cm] wide
			2. 1/4-inch [0.635 cm] thick.
2. EQUIPMENT
	1. Electrical
		1. Conduit
			1. PVC, schedule 40.
			2. PVC, schedule 80.
			3. PVC coated galvanized steel.
			4. Galvanized steel.
		2. Load Center
			* 1. Plug-in style breakers.
				2. Style

\_\_\_\_\_ A main lug, convertible.

\_\_\_\_\_ A main circuit breaker (MCB).

* + - * 1. NEMA

1 metallic.

3R metallic.

* + - * 1. Phase

Single phase.

Three phase.

* + - * 1. Square D QO11224L125GC.
				2. *Specialty*

*125 A main lug.*

*8 space.*

*NEMA 3R thermoplastic*

*Single phase.*

*GE TPL412R.*

* + 1. Outlet
			1. Interior.
			2. 20 A GFCI.
			3. Commercial grade duplex.
			4. Clear weather cover.
		2. Switch
			1. Exterior.
			2. Duplex.
				1. Independent control of interior lights and fan.
		3. Wiring
			1. Stranded 12 gauge THHN.
	1. HVAC
		1. Fan
			1. 585 CFM [0.46 CMM].
			2. Exhaust.
			3. Fiberglass hood with fixed fiberglass insect screen.
		2. Heater
			1. 1,500 watts.
			2. Shallow wall mount frame.
			3. Line powered.
			4. Integral thermostat.
		3. Shutter
			1. 10-inch x 10-inch [25.4 cm x 25.4 cm].
			2. Intake.
			3. Fiberglass hood with fixed fiberglass insect screen.
	2. Lighting
		1. Control
			1. Exterior duplex switch box.
				1. Independent control of interior light and fan.
		2. Fixture
			1. LED.
			2. 70 watt (7,100 lumens).
			3. Multi-volt (120-277 VAC, 60 Hz) ballast.
			4. Wet location, IP65.
	3. Mounting
		1. (2) 48-inch [121.9 cm] L slotted fiberglass mounting struts (for use with user-supplied mounting panel).
		2. Full width x full height encapsulated 3/4-inch [1.905 cm] thick plywood mounted panel.
1. Execution
	1. Examination
		1. Verify that the Modular Shelter dimensions are correct and that the site conditions are suitable for installing the unit.
		2. Modular Shelters must remain sealed between the section joints. Where required, apply one or two continuous beads of silicone on all exterior section joints before proceeding with the installation.
	2. Installation
		1. Concrete Foundation Slab
			1. Provide a concrete foundation slab on which to mount / secure the Modular Shelter. The slab should extend a minimum of 6-inches [15.24 cm] on all sides beyond the Modular Shelter and the base mounting flange (if external).
			2. The thickness of the slab should be a minimum of 6-inches [15.24 cm], but as local soil conditions may vary, the final design of the slab and anchoring details are the responsibility of the installing party and must be sized so as to prevent wind uplift and any other applicable local conditions.
			3. The slab must have a smooth, troweled surface to provide uniform support over the entire base structure. The slab must be level in both directions to within 1/8-inch [0.3175 cm] and free from exposed aggregate and debris.
		2. Lifting the Modular Shelter
			1. Inspect all of the lifting lugs to verify that they are tightly secured to the Shelter sections.
			2. **Inspect the installation location and surrounding areas for any obstacles (INCLUDING OVERHEAD) that may cause difficulties or present a hazard – addressing them as necessary before proceeding.**
			3. On the concrete foundation slab caulk out the corners of the intended location of the Modular Shelter, making sure the installation is square.
			4. Using **ALL** of the provided lifting lugs and **PROPER RIGGING TECHNIQUES**, move the Modular Shelter to the desired installation location.
			5. If the installation location is suitable and the installation square, lift the Modular Shelter so that the provided base mounting flange sealant can be applied.
			6. Apply the sealant and then lower the Modular Shelter onto the slab.
		3. Securing the Modular Shelter
			1. With all doors shut, drill the concrete foundation slab at each pre-drilled base mounting flange location to the size / depth as indicated by the anchor bolt manufacturer.
			2. During initial setting of the Modular Shelter, anchor bolt locations may be skipped to minimize the time needed to square the Modular Shelter on the slab.
			3. Verify the operation of the door(s).
			4. Once the Modular Shelter has been squared on the slab, the initial anchor bolts should be securely tightened.
			5. With the initial anchor bolts secured, the remaining anchor bolts should be installed and secured.
			6. Verify the operation of the door(s).
			7. All anchor bolt locations should be used to ensure that wind uplift cannot occur.
	3. Seal
		1. **While factory sealed, the seams of modular shelters should be inspected after installation for watertightness. This inspection should also take place annually. Seal as necessary.**
	4. Adjust and Clean
		1. Verify that the complete installation meets the criteria above and any additional criteria supplied by the Engineer.
		2. Clean surfaces in accordance with the manufacturer’s operation and maintenance instructions.
		3. Remove all trash and debris, leaving the site in a clean condition.