

FRP Flat Cover Standard Specification–Section11558

1. General Information

These flat covers shall be self-supporting. Either of two designs shall be the structure and the configuration:

- Raised Diamond nonskid Panel span shall not be more than 6’ between support structures except conditions do not permit. Access hatches and accessories provided as needed shall be of similar integrated FRP material.
- Distinct panels and beams can be used with backing of 316 stainless steel supports if needed when the clearance below the cover is not an apprehension.
- Structural members shall rest on the chamber wall, when the clearance below the cover is an apprehension.

Following standards shall apply to the FRP covers as follow in this specification:

- Minimum Design Loads for Buildings and Other Structures: ANSI/ASCE 7-98
- Standard Recommended Practice for Classifying Visual Defects in Glass Reinforced Laminates: ANSI/AWWA-F102-91

2. Physical properties

Property at 70F°	Beams	Planks	Test Method
Tensile Strength	29,000 psi	27,000 psi	ASTM D 638
Tensile Modulus	2,500,000 psi	1,600,000 psi	ASTM D 638
Compressive Strength	29,000 psi	27,000 psi	ASTM D 695
Compressive Modulus	2,500,000 psi	1,600,000 psi	ASTM D 695
Flexural Strength	29,000 psi	30,000 psi	ASTM D 790
Flexural Modulus	2,500,000 psi	1,600,000 psi	ASTM D 790
Shear Strength	13,000 psi	13,000 psi	ASTM D 2344
Shear Modulus	480,000 psi		ASTM D 2583
Barcol Hardness	40		ASTM D 2583
Glass Content	45%		ASTM D 2584
Water Absorption (Max)	0.09%		ASTM D 570
Coefficient of Linear Thermal Expansion (in/in/°F)	15x10 ⁻⁶		ASTM D 696

Table 1: Laminate Minimum Physical Properties

3. Design Criteria

The Flat covers will be designed under ANSI/ASCE 7-98:

- Personnel load: 300 lbs. in 12" square with an L/240
- Environmental load: 50 psf minimum (or designated area data per ANSI/ASCE 7-98) with an L/240
- Snow load: In accordance with ANSI/ASCE 7-98 for the designated area, the value shall be as calculated
- Wind load: 100 mph minimum (or designated area data per ANSI/ASCE 7-98)
- Seismic zone requirements per ANSI/ASCE 7-98 for the designated area.
- Design safety factor of 4:1 for allowable stresses shall be met for all load combinations.
- Horizontal loads shall be contained by both support structures and panel sections.
- The design and installation shall incorporate provisions for thermal expansion and contraction over an ambient air temperature range of -30 to 120F.

4. Materials

Materials for the FRP Flat covers shall be chosen accordingly to the function and service specified. The raw materials shall be new and shall exist in their preside standards in the usage. Not any of the material shall be used in the construction which the engineer rejects. Approval for incorporation into the project will be made only after the review of shop drawings and specifications.

The Edgeng flat covers are made out of a resin which shall be corrosion resistant polyester. Ultraviolet-light inhibitors shall be added to the laminate to prevent degradation due to sun light.

5. General Requirements

FRP High strength molded material shall be used to develop all structural components. Cut edges or drilled holes shall be sealed with paraffinated resin solution. A non-skid surface shall be supplied that is comprised of aliphatic acrylic polyurethane non-skid coating with UV protection and RAISED molded Diamond Pattern on top of plank surface. Gasketing for panel joints shall be EPDM sponge. If required on the contract drawings access hatches and accessories shall be provided on cover segments.

6. Submittals

The final project approval will be made after all the drawings, specifications and data are reviewed precisely. The shop drawings shall be drawn of the required projects according to all the dimensions, anchor locations and the location area dimensions.

Specifications for the relevant project in all areas of components shall be provided. Details of the major fabricated components showing the arrangement of components and labeled with component sizes and materials of construction shall be submitted.

Structural calculations for all components shall be submitted. Manufacturer's commended procedures for job site storage of equipment, handling, and erection shall be submitted.

The fabricator shall supply any and all analyses relevant to the composite design as a part of the shop drawings. To the sections where the conventional methods are not being applied, the

standard strengths of materials and finite element analysis of each section should be included in the calculations. Furthermore, for the calculated loads, a complete laminate analysis shall be submitted identifying the various factors of safety for the proposed laminate schedule. The evaluation of deflection and stresses on panel sections under uniform loading shall incorporate numerical analysis calculations.

7. Quality Assurance

A. Qualifications:

- Five years successful experience in fabricating FRP Flat cover systems would be the minimum requirement for the manufacturer.
 - FRP flat cover manufacturer shall retain a registered professional engineer legally qualified to practice in same state as the Site.
 - Responsibilities include:
 - FRP cover system performance and design criteria stated in the Contract Documents shall be reviewed.
 - Written requests should be prepared for clarifications or interpretations of performance or design criteria for submittal to engineer or contractor.
 - Preparation of design calculations verifying compliance of FRP cover system with requirements of the Contract Documents should be supervised.
 - Signing and sealing all calculations.
 - Design of FRP flat cover system was performed in accordance with performance and design criteria stated in the Contract Documents should be certified
- Installer Qualifications
 - Retain a single installer trained and with record of successful experience in installing FRP cover systems.
 - Installer shall have record of successfully installing FRP cover systems in accordance with recommendations and requirements of manufacturer, or shall provide evidence of being acceptable to the manufacturer.
 - Installer shall employ only tradesmen with specific skill and successful experience in the type of Work required.
 - When requested by the engineer, submit name and qualifications of installer with the following information for at least three successful, completed projects:
 - Names and telephone numbers of owner and architect or engineer responsible for each project.
 - Approximate contract cost of the FRP cover systems for which installer was responsible.

B. System Manufacture

1. EDGENG

Contact Information 405-888-6327

Or Approved equal.

2. If Contractor wished to furnish an alternate system manufacturer, Contractor shall first make written application to Engineer for acceptance thereof, certifying that the proposed substitute will perform adequately the functions and achieve the results called for by the general design, be similar in substance to that specified and be suited to the same use as that specified. The application will also contain an itemized estimate of all costs or credits that will result directly or indirectly from acceptance of such substitute, including costs of redesign and claims of other contractors affected by the resulting change, all of which will be considered by Engineer in evaluating the proposed substitute.

C. Source Quality Control:

1. Obtain all products included in this Section regardless of component manufacturer, from a single cover system manufacturer.
2. FRP cover system manufacturer shall prepare all Shop Drawings and other submittals (except for delegated design submittals, when professional engineer is retained by other than cover manufacturer) for all components furnished under this Section.
3. Components shall be specifically constructed for specified service conditions and shall be integrated into overall assembly by FRP cover manufacturer.

8. Warranty

From date of shipment of the fabricated flat cover for materials and workmanship minimum of one (1) year after installation with a maximum of eighteen (18) months would be the general warranty for these FRP flat cover systems.

The contractor shall be responsible for verifying all field dimensions to develop and approve shop drawings.

9. Fabrication

Adequate drainage of water from cover shall be provided. A minimum of ¼" rise over 1' length shall be required for this purpose.

All field measurements with the approved flat cover fabrication drawing shall be confirmed by the contractor before fabrication is initiated.

All hardware to be 316 Stainless Steel materials.

10. Shop Assembly

A minimum of three (3) equal cover segments to a full scale layout to insure proper fit and assembly shall be pre-assembled by the contractor. If cover consists of less than (3) equal segments, the manufacturer shall pre-assemble the cover in its entirety for proper fit.

Fiberglass cutouts from cover segments shall be identified and shipped with cover. Cutouts will be used by the engineer to determine proper thickness, glass content and laminate sequence.

(Hand lay-up only)

Assembly of panel segments will be such as to allow all bolting to be performed from the exterior of cover.

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