

SECTION 08220

FIBERGLASS REINFORCED PLASTIC (FRP) DOORS AND FIBERGLASS RESIN TRANSFER MOLDED DOOR FRAMES

MODEL CP1 STANDARD CONSTRUCTION SERIES MANUFACTURED IN THE UNITED STATES OF AMERICA

PART 1 - GENERAL

1.1 SUMMARY

- A. This Section Includes The Following:
1. Fiberglass Reinforced Plastic (FRP) Doors
 2. Fiberglass Resin Transfer Molded Door Frames

1.2 RELATED SECTIONS

- A. Related Sections Include The Following:
1. Division 0 – Bidding and Contract Requirements
 2. Division 1 – General Requirements
 3. Division 8 – Finish Hardware
 4. Division 8 – Glazing

1.3 QUALITY ASSURANCE

Test certification by an independent and accredited laboratory is required for the properties listed in this Quality Assurance section. Reports shall be made available upon request for each of the standards and certifications described below.

- A. Reference Standards
1. Door Properties
 - a) Standard test method for steady state thermal transmission properties by means of the heat flow meter apparatus.
 - b) Successfully completed 1,000,000 cycles test in accordance with:
AAMA 920-03 – Specification for Operating Cycle Performance of Side-Hinged Exterior Door Systems.
ANSI A250.4-2001 – Test Procedure and Acceptance Criteria for Physical Endurance for Steel Doors, Frames, Frame Anchors and Hardware Reinforcings.
NWWDA TM-7 Test Method to Determine the Physical Endurance of Wood Doors and Associated Hardware Under Accelerated Operating Conditions.
 - c) Florida Building Code
SFBC PA 201 Impact Procedures for Large Missile Impact
SFBC PA 202 Uniform Static Load on Building Components
SFBC PA 203 Products Subjected to Cycle Wind Pressure
SFBC 3603.2 Forced Entry Test
ASTM E 1886 Impact and Cycling, Large Missile Impact
ASTM E 1996 Specifications for Performance of Exterior Doors
ASTM C 518 Heat Transfer
ASTM D 1761 Mechanical Fasteners

2. Laminate Properties

Door face plate is a **minimum of 0.125 inch thick** fiberglass reinforced plastic molded into one continuous sheet starting with a **25 mil resin-rich gelcoat layer resin integrally molded** with multiple layers of 1.5 oz. sq ft fiberglass mat and one layer of **18 oz per square yard fiberglass woven roving** saturated with special resin. **Door plate weight shall not be less than 0.97 lbs per square foot at a ratio of 30/70 glass resin.**

Laminated **plate by itself** evaluated in accordance with Florida Building Code TAS 201 **Large Missile Impact** Test as per ASTM-1996-05b, Standard Specification for Performance of Exterior Windows, Curtain Wall, Doors and Storm Shutters Impacted by Windborne Debris in Hurricanes. **The missile (a 2 x 4 with a weight of 9 lbs shot from a cannon at a velocity of 50 ft/sec) did not penetrate the door face plate.**

- a) ASTM D 638 Tensile Strength Properties of Plastic
- b) ASTM D 790 Flexural Strength Properties of Plastic
- c) ASTM D 2583 Indention Hardness of Plastics
- d) ASTM D 256 Izod Pendulum Impact Resistance
- e) ASTM D 792 Density/Specific Gravity Of Plastics
- f) ASTM D 1761 Mechanical Properties of Fasteners
- g) ASTM E 84 Surface Burning Characteristics of Materials
- h) ASTM G 155 Xenon Light Exposure of Non Metallic Materials
- i) ASTM D 635 Method For Rate of Burning
- j) ASTM D 2843 Smoke Density
- k) ASTM D 1929 Self Ignition Temperature Properties
- l) SFBC PA 201 Impact Procedures for Large Missile Impact

3. Core Properties

- a) ASTM C 177 Thermal Properties of Materials
- b) ASTM D 1622 Density and Specific Gravity
- c) ASTM E 84 Surface Burning Characteristics of Materials
- d) WDMA TM-10 and TM-5 Firestop ASTM E 152 U.L 10(b)
- e) ASTM E90-04- Sound Transmission Loss
- f) ASTM E413-04- Classification for Rating Sound Insulation
- g) ASTM E1332-90- Standard Classification for Determination of Outdoor-Indoor Transmission Class
- h) ASTM E2235-04- Standard Test for Determination of Decay Rates for Use in Sound Insulation Methods

B. Qualifications

1. **Manufacturer Qualifications:** A company specialized in the manufacture of fiberglass reinforced plastic (FRP) doors and frames as specified herein **with a minimum of 30 years documented experience** and with a record of successful in-service performance for the applications as required for this project.
2. **Installer Qualifications:** An experienced installer who has completed fiberglass door and frame installations similar in material, design, and extent to those indicated and whose work has resulted in construction with a record of successful in-service performance.
3. **Source limitations: Obtain fiberglass reinforced plastic doors and resin transfer molded fiberglass frames through one source fabricated from a single manufacturer, including fire rated fiberglass frames. This ensures complete uniformity of physical properties and consistency in the resin chemistry tailored for this application.**
4. **Source limitations:** Hardware and accessories for all FRP doors as specified in Section 08710 shall be provided and installed by the fiberglass door and frame manufacturer.
5. **Source Limitations:** Glass for windows in doors shall be furnished and installed by door and frame manufacturer in accordance with related section, Division 8, Glazing.

1.4 SUBMITTALS

- A. Product Technical Data Including:
 - 1. Acknowledgment that products submitted meet requirements of standards referenced.
 - 2. Manufacturer shall provide certificate of compliance with current local and federal regulations as it applies to the manufacturing process.
 - 3. Manufacturer's installation instructions.
 - 4. **Schedule of doors** and frames indicating the specific reference numbers used on the **owner's project documents, noting door type, frame type, size, handing and applicable hardware.**
 - 5. Details of core and edge construction. including factory construction specifications.
 - 6. Certification of manufacturer's qualifications.
- B. Submittal Drawings for Customer Approval Shall be Submitted Prior to Manufacture and Will Include the Following Information and Formatting:
 - 1. **Summary door schedule indicating the specific reference numbers as used on owner's drawings, with columns noting door type, frame type, size, handing, accessories and hardware.**
 - 2. **A drawing depicting front and rear door elevations showing hardware with bill of material for each door.**
 - 3. **Drawing showing dimensional location of each hardware item and size of each door.**
 - 4. **Individual part drawing and specifications for each hardware item and FRP part or product.**
 - 5. **Construction and mounting detail for each frame type.**
- C. Samples:
 - 1. **Provide one complete manufactured door sample which represents all aspects of the typical manufacturing process, including molded in gelcoat color and face plate construction. One edge should expose the interior of the door depicting the unique u-shaped continuous piece stile and rail, hardware reinforcement and core material.**
- D. Operation and Maintenance Manual
 - 1. Include recommended methods and frequency for maintaining optimum condition of fiberglass doors and frames under anticipated traffic and use condition.
 - 2. Include one set of final as built drawings with the same requirements as mentioned in Section B above.
 - 3. Include certificate of warranty for door and frame listing specific door registration numbers.
 - 4. Include hardware data sheets and hardware manufacturer's warranties.

1.5 DELIVERY, STORAGE, AND HANDLING

- A. Each door and frame shall be delivered **individually crated** for protection from damage in cardboard containers, **clearly marked** with project information, door location, specific reference number as shown on drawings, and shipping information. **Each crate shall contain all fasteners necessary for installation as well as complete installation instructions.**
 - 1. Doors shall be stored in the original container on edge, out of inclement weather for protection against the elements.
 - 2. Handle doors pursuant to the manufacturer's recommendations as posted on outside of crate.

1.6 WARRANTY

- A. All fiberglass doors and frames have a lifetime guarantee against failure due to corrosion. Additionally, fiberglass doors and fiberglass frames are guaranteed for ten years against failure due to materials and workmanship, including warp, separation or delamination, and expansion of the core.
- B. On site assistance available.

PART 2 – PRODUCTS

2.1 ACCEPTABLE MANUFACTURERS

Subject to compliance with the Contract Documents, the following manufacturers are acceptable:

- A. **Chem-Pruf Door Co., Ltd., P.O. Box 4560 Brownsville, Texas 78523 Phone: 1-800-444-6924-7943, Fax: 956-544-7943, Website: www.chem-pruf.com**
- B. Substitutions may be considered provided manufacturer can comply with the specifications as written herein and said products are manufactured in the United States of America. Requests for substitution must be submitted in writing no less than 10 days prior to bid date. Substitution request to include a physical sample and written documentation that product will meet the specific manufacturing methods as highlighted below.

2.2 FRP DOORS

- A. **Doors** shall be made of **fiberglass reinforced plastic (FRP) using Class 1 premium resin with no fillers that is specifically tailored to resist chemicals and contaminants typically found in environment for which these specifications are written.** Doors shall be 1 ¾ inch thick and of flush construction, **having no seams or cracks.** For consistency in the resin chemistry tailored for this application and to **maintain the same physical properties throughout the structure,** all fiberglass components including face plates, stiles and rails and frames **must be fabricated by the same manufacturer.** Components obtained through various outside sources for plant assembly will not be accepted.
- B. **Door Plates** shall be **0.125 inch thick minimum,** molded in one continuous piece, starting with **25 mil gelcoat of the color specified, integrally molded** with multiple layers of 1.5 ounces per square foot fiberglass mat and **one layer of 18 ounce per square yard fiberglass woven roving.** Each layer shall be individually laminated with resin as mentioned above. **Door plate weight shall not be less than 0.97 lbs per square foot at a ratio of 30/70 glass to resin. Plate alone to withstand Large Missile Impact per FBC TAS 201.** Face plates manufactured using the pultrusion process does not allow for a smooth molded gelcoat finish, the use of woven roving for adequate plate thickness, strength and weight, or the appropriate glass to resin ratio and will not meet the quality standards of this project.
- C. **Stiles and Rails** shall be constructed starting from the outside toward the inside, with a matrix of at least three layers of 1.5 ounce per square foot of fiberglass mat. The stile and rail shall **be molded in one continuous piece to a U-shaped configuration** and to the exact dimensions of the door. In this manner there will **be no miter joints and disparate materials** used to form the one-piece stile and rail.
- D. **Core** material shall be **Polypropylene plastic honeycomb core with a non woven polyester veil for unparalleled plate bonding, 180 PSI typical compression range** unless otherwise requested.
- E. **Internal Reinforcement** shall be #2 SPF of sufficient amount to adequately support required hardware and function of same.
- F. **Finish** of door frame shall be identical with **25 mil resin-rich gelcoat of the specified color integrally molded in at time of manufacture resulting in a smooth gloss surface that is dense and non-porous.** To achieve optimum surface characteristics, the gelcoat shall be cured within a temperature range of 120F to 170F creating an **impermeable outer surface, uniform color throughout,** and a **permanent homogeneous bond** with the resin/fiberglass substrate beneath. **Only the highest quality gelcoat will be used to ensure enduring color and physical properties.** Paint and/or post application of gelcoat results in poor mechanical fusion and will be deemed unacceptable for this application. The finish of the door and **frame must be field repairable** without compromising the integrity of the original uniform composite structure, function or physical strength.

- G. **Window** openings shall be provided for at time of manufacture and shall be completely sealed so that the interior of the door is not exposed to the environment. **Fiberglass retainers**, which hold the glazing in place, **shall be resin transfer molded** with a profile that drains away from glazing. The window **retainer must match the color and finish of the door plates** with 25 mil of resin-rich gelcoat integrally molded in at time of manufacture. Mechanical fasteners shall not be used to attach retainers. **Glass**, as specified herein, **shall be furnished and installed by door and frame manufacturer**. In order to maintain uniform appearance, product longevity and the corrosion resistance this application requires, window retainers fabricated from Metal, PVC or Vinyl will not be accepted.
- H. **Louver** openings shall be completely sealed so that the interior of the door is not exposed to the environment. **Louvers are to be solid fiberglass “V” Vanes and shall match the color and finish of the door plates.**
- I. **Transoms** shall be identical to the doors in finish, construction, materials, thickness and reinforcement.

2.3 FRP FRAMES

- A. **Frames** (rated and non-rated) shall be **fiberglass** and manufactured using **the resin transfer method creating one solid piece** (no voids) with complete uniformity in color and size. Beginning with a minimum **25 mil gelcoat layer molded** in and a minimum of two layers of continuous strand fiberglass mat saturated with resin, the frame will be of one-piece construction with molded stop. All frame profiles shall have a core material of 2 psf polyurethane foam. **Metal frames or pultruded fiberglass frames will not be accepted.**
- B. **Finish** of frame shall be identical to the door with **25 mil resin-rich gelcoat of the specified color integrally molded** in at time of manufacture. To achieve optimum surface characteristics, the gelcoat shall be cured within a temperature range of 120F to 170F creating **an impermeable outer surface, uniform color throughout, and a permanent homogeneous bond** with the resin/fiberglass substrate beneath. Only the highest quality gelcoat will be used to ensure enduring color and physical properties. Paint and/or post application of gelcoat result in poor mechanical fusion and will be deemed unacceptable for this application. The finish of the door and **frame must be field repairable** without compromising the integrity of the original uniform composite structure, function or physical strength.
- C. **Jamb/Header** connection shall be mitered for tight fit.
- D. **Internal Reinforcement** shall be continuous within the structure to allow for mounting of specified hardware. Reinforcing material shall be a **dense matrix of cloth glass fibers and premium resin** with a minimum hinge **screw holding value of 1000 lbs per screw. All reinforcing materials shall be completely encapsulated.** Documented strength of frame screw holding value after third insert must be submitted. Dissimilar materials, such as steel, will be deemed unacceptable as reinforcement for hardware attachment.
- E. **Mortises** for hardware shall be accurately machined by **CNC** to hold dimensions to +/- 0.010 inch in all three axis.
- F. **Hinge pockets** shall be accurately machined **by CNC to facilitate heavy duty hinges at all hinge locations**, using shims when standard weight hinges are used.

2.4 HARDWARE

- A. See Section 08710
- B. The special nature of this material requires that all related **hardware as specified must be furnished and installed by the door frame manufacturer to maintain product quality and function as well as to ensure sufficient support/reinforcement, precision tooling and proper sealing methods are provided.**

PART 3 – EXECUTION

3.1 INSTALLATION CONDITIONS

- A. Verification of Conditions
 - 1. Verify openings are correctly prepared to receive doors and frames.
 - 2. Verify openings are correct size and depth in accordance with submittal drawings.
- B. Installer’s Examination
 - 1. Door installer shall examine conditions under which construction activities of this section are to be performed and submit a written report to general contractor if conditions are unacceptable.
 - 2. General Contractor shall submit two copies of the installer’s report to the architect within 24 hours of receipt.
 - 3. Installer shall not proceed with installation until all unacceptable conditions have been corrected.

3.2 INSTALLATION

- A. Doors shall be delivered at job site **individually crated**. Each crate to be clearly marked with the specific opening information for quick and easy identification.
- B. All single doors to be **shipped completely assembled in the frame with hardware installed**. Double doors to be **prehung at the factory to ensure a proper fit** and that hardware functions properly, then disassembled for shipping purposes.
- C. Install door opening assemblies in accordance with shop drawings and manufacturer's printed installation instructions, using installation methods and materials specified in installation instructions.
- D. Field alteration of doors or frames to accommodate field conditions is strictly prohibited.
- E. Site tolerances: Maintain plumb and level tolerance specified in manufacturer's printed installation instructions.
- F. Fire labeled doors, frames and any associated hardware must be installed by qualified professional installers in strict accordance with manufacturer's instructions and the latest revision of NFPA 80.

3.3 ADJUSTING

- A. Adjust doors in accordance with the door manufacturer's maintenance instructions to swing open and shut without binding and to remain in place at any angle without being moved by gravitational influence.
- B. Adjust door hardware to operate correctly in accordance with hardware manufacturer's maintenance instruction.

3.4 CLEANING

- A. Clean surfaces of door opening assemblies and exposed door hardware in accordance with respective manufacturer's maintenance instructions.

3.5 PROTECTION OF INSTALLED PRODUCTS

- A. Protect door opening assemblies and door hardware from damage by subsequent construction activities until final inspection.

End of Section