

Section 2577

Fiberglass Wet Wells

PART 1: General

- 1.1 *Designs* –
- 1.1.1 *Design Plans* - The EOR shall be responsible for determining wetwell sizes, dimensions, elevations, etc per the ECUA Engineering Manual and coordination with ECUA staff.
 - 1.1.2 *Delegated Engineering Document* - The Contractor shall provide engineered designs, signed and sealed by a Florida Professional Engineer, in the form of a Delegated Engineering Document for wetwell related components and systems. See Section 1.3 below.
- 1.2 *Approved Manufacturers* – Wet wells shall be manufactured by L.F. Manufacturing, Inc. (LFM), Edwards Fiberglass, Inc., or Associated Fiberglass Enterprises (AFE).
- 1.3 *Submittals* – Supply shop drawings, product info, Delegated Engineering Document, etc per ECUA Technical Specification 2575- Lift Stations, Section 1.4-Pre-construction Submittals.
- 1.4 *Warranty* – The fiberglass Manufacturer shall warrant the fiberglass wet well against defects for at least twenty (20) years after the date of acceptance by ECUA. Defects are defined as cracking, delaminating, or leaking. The warranty shall require the Manufacturer to supply all necessary labor, materials, and equipment to repair defects to the satisfaction of ECUA. The Contractor and/or Manufacturer shall not make any exemption or exception to the above stated conditions or warranty. Manufacturer's recommended installation procedures to assure 20-year warranty provided to ECUA to be included in submittal package.
- 1.5 *Handling* – The wet well shall not be dropped or impacted. Wet wells shall be chocked if stored horizontally. If wet wells must be moved by rolling, the ground transverses shall be smooth and free of rocks, debris, etc. FRP wet wells may be lifted by the installation of three lifting lugs as specified by the Manufacturer on the outside surface near the top or by a sling or "choker" connection around the center. Use of chains or cables in contact with the wet well surface is prohibited. Wet wells may be lifted horizontally using one support point.

PART 2: Materials

- 2.1 *Resin* – The resins used shall be commercial grade unsaturated polyester resins with fiberglass reinforcements.
- 2.2 *Reinforcing Materials* – The reinforcing materials shall be a commercial Grade "E" type glass in the form of mat, continuous roving, chopped roving, roving fabric, or a combination of the above, having a coupling agent that will provide a suitable bond between the glass reinforcements and the resin.
- 2.3 *Surfacing Materials* – If reinforcing materials are used on the surface exposed to the contained substance, it shall be a commercial grade chemical-resistant glass that will provide a suitable bond with the resin and leave a resin rich surface.

- 2.4 *Fillers and Additives* – Fillers, when used, shall be inert to the environment and wet well construction. Additives, such as thixotropic agents, catalysts, promoters, etc., may be added as required by the specific manufacturing process to be used. The resulting reinforced plastic material must meet the requirement of this specification.
- 2.5 *Color* – Inside surface and outside surface of wetwell shall preferably be white in color. Light gray or light tan is acceptable, with ECUA permission. Other colors will not be accepted and will result in wetwell rejection.
- 2.6 *Quality Assurances* – Comply with the latest published editions of AWWA and ASTM Standards:

ASTM D883	Standard Terminology Related to Plastics
ASTM D3299	Standard Specification for Filament-Wound Glass-Fiber-Reinforced Thermoset Resin Corrosion-Resistant Tanks
ASTM D3753	Standard Specifications for Glass-Fiber-Reinforced Polyester Manholes and Wet Wells
ANSI / AWWA D120-09	AWWA Standard for Thermosetting Fiberglass- Reinforced Plastic Tanks

PART 3: Physical Requirements

- 3.1 *Load Rating* – The complete wet well shall have a minimum dynamic-load rating of 16,000 ft-lbs when tested in accordance with ASTM 3753, Section 8, test methods D 790 and D 695. To establish this rating the complete wet well shall not leak, crack, or suffer other damage when load tested to 40,000 ft-lbs and shall not deflect vertically downward more than 1/4 inch at the point of load application when loaded to 24,000 lbs.
- 3.2 *Stiffness* – The wet well cylinder shall have a minimum pipe-stiffness value as shown in the following table when tested in accordance with ASTM D3757, Section 8.

Stiffness	
Length - Ft.	F/AY - PSI
10 to 20	2.01
21 to 30	3.02
31 to 40	5.24

Physical Properties		
Property	Hoop Direction (psi)	Axial Direction (psi)
Tensile Strength	18,000	5,000
Tensile Modules	0.8 x 10 ⁶	0.7 x10 ⁶
Flexural Strength	26,000	4,500
Flexural Modules		
(no ribs - 48", 60", 72")	1.4 x 10 ⁶	0.7 x 10 ⁶
(with ribs - 96", 144")	0.7 x 10 ⁶	0.7 x 10 ⁶

PART 4: Fabrication

- 4.1 *One Piece Unit* - Unless otherwise approved by ECUA, wetwell shall be a one piece unit.
- 4.2 *Exterior Surface* – The exterior surface shall be relatively smooth with no sharp projections. Hand-work finish is acceptable if enough resin is present to eliminate fiber show. The exterior surface shall be free of blisters larger than 1/2 inch in diameter, delamination and fiber show.
- 4.3 *Interior Surface* – The interior surface shall be resin rich with no exposed fibers. The surface shall be free of crazing, delamination, blisters larger than 1/2 inch in diameter, and wrinkles of 1/8 inch or greater in depth. Surface pits shall be permitted if they are less than 3/4 inch in diameter and less than 1/16 inch deep.
- 4.4 *Defects Not Permitted* –
- 4.4.1 *Exposed fibers* – Glass fibers not wet out with resin. Resin runs: runs of resin and sand on the surface. Dry areas: areas with glass not wet out with resin. Delamination: separation in the laminate.
- 4.4.2 *Blisters* – Light colored areas larger than ½ inch in diameter. Crazing: cracks caused by sharp objects.
- 4.4.3 *Pits or Voids* – Air pockets.
- 4.4.4 *Wrinkles* – Smooth irregularities in the surface.
- 4.4.5 *Sharp Projections* – Fiber or resin projections requiring gloves for handling.
- 4.5 *Mounting of Brackets* – Manufacturer shall affix minimum ¼” thick 316 stainless steel backer plates to exterior of wetwell at locations where brackets attach to wetwell. Manufacturer shall determine quantity and size of 316 stainless steel hardware to be used for fastening. The bolts shall be inserted through backer plates, with bolt heads welded to backer plate. Bolts and nuts shall be fastened together to bracket on interior of wetwell. Exterior backer plate shall be glassed over at factory.
- 4.6 *Markings* – Each wet well shall have wet well data integrated into fiberglass and affixed to top inside and top outside walls. Data required includes Manufacturer’s name, ASTM designation, production and/or serial number, production date, length and diameter, and warranty length. Product data shall not be written in ink or paint. Production/serial numbers shall be kept on file by Manufacturer for a minimum of 20 years and shall be accompanied by project data for future reference and recall. The following is an example:
- ABC Fiberglass Manufacturing
ASTM D3753
Serial # ABC20163461
Production date: October 22, 2016
Depth = 22’
Diameter = 10’
20 Year Warranty
- 4.7 *Conduit Cutouts* – Make with hole-saw and fill annular space with watertight fitting.

- 4.8 *Discharge Pipe Installation* – Discharge wall penetrations shall have fiberglass necks large enough to accept O.D. of pipe discharge flange and shall be installed via a gas tight-water tight Link Seal system.
- 4.9 *Influent Pipe Installation* – It is preferable that the Manufacturer install at factory a laminated fiberglass neck at location of influent pipe per plans. The neck diameter and length shall be sized to accept the Link Seal required for the influent pipe diameter. Annular spaces on both sides of Link Seal shall be filled with fiberglass. Alternatively, and with ECUA's prior approval, the Manufacturer may install the laminated fiberglass neck in the field. Neither the Contractor nor Manufacturer's representatives will be allowed to do this field installation. Any performed field installations shall meet or be covered by the original manufacturer's 20-year warranty.

PART 5: Excavation and Installation

- 5.1 *General* – The limit of excavation shall be such to allow for placing and removing forms, installing sheeting, shoring, bracing, etc. Excavation shall meet the OSHA Excavation Standards (29 CFR sub- part P). The Contractor shall pile excavated material in a manner that will not endanger the work and will avoid obstructing sidewalks, driveways, power poles, etc. Drainage shall be kept clear.
- 5.2 *Unauthorized Excavation* – Excavation for slabs, footings, etc., that bear on earth shall not be carried below the elevation shown on the drawings. In the event the excavation is carried on below the indicated elevation, the Contractor shall bring the slab, footing etc., to the required grade by filling with concrete having a minimum compressive strength of at least 3,000 psi at 28 days.
- 5.3 *Vertical Sides (Sheeting, Shoring and Bracing)* – When necessary to protect existing or proposed structures or other improvements, the Contractor shall maintain vertical sides of the excavation. The limit shall not exceed three feet outside the footing on a vertical plane except where specifically approved otherwise by the Engineer. The Contractor shall provide and install any sheeting, shoring, and bracing as necessary to provide a safe work area to protect workers, structures, equipment, power supply, and property. The sheeting, shoring, and bracing shall be removed as the excavation is backfilled in such manner as to prevent injurious caving.
- 5.4 *Sloping Sides* – Where sufficient space is available, the Contractor shall be allowed to back slope the sides of the excavation. The back slope shall be such that the excavation shall be safe from caving. The type of material being excavated shall govern the back slope used, but in any case the back slope shall be no steeper than 1 foot horizontal to 1 foot vertical without sheeting or shoring.
- 5.5 *De-Watering* – The Contractor shall keep excavation free from water by use of cofferdams, bailing, pumping, well pointing, or any combination as the particular situation may warrant. All de-watering devices shall be installed in such a manner as to provide clearance for construction, removal of forms, and inspection of exterior of form work. It is the intent of these specifications that the foundation be placed on a firm dry bed. The foundation bed shall be kept in a de-watered condition a sufficient period of time to ensure the safety of the structure. The excavation shall be protected from excessive rainfall, drainage and drying. The excavation shall be inspected and approved by ECUA's representative before work on the structure is started. It is the intent of these specifications that the Contractor provides a relatively smooth, firm foundation bed for footing and slabs that bear directly on the undisturbed earth without additional cost, regardless of

the soil conditions encountered. The Engineer will be the sole judge as to whether these conditions have been met.

- 5.6 *Bottom of Excavation and Anti-Flotation Base* – Consult Delegated Engineering Document on compaction requirements for bottom of excavation, structural reinforcement requirements, and concrete anti-flotation base dimensions. Install wetwell per Manufacturer's and Delegated Engineering Documents requirements.
- 5.7 *Installation* – Contractor shall install wetwell to meet final grades per plans and shall insure wetwell is plum and level.

PART 6: Backfill

- 6.1 *Backfill Material* – Unless shown otherwise on the drawings, suitable soil (A-3 sand only, no clay or rocks larger than 3/4-inch size) shall be used for backfill around the wet well for a distance of two feet from the outside surface and extending from bottom of the excavation to the bottom of the top slab. The material chosen shall be free of large lumps or clods, which will not readily break down under compaction. This material will be subject to approval by the Engineer. Backfill material shall be free of vegetation or other extraneous material. Excavation materials which are to be used for fill or backfill may be stockpiled on site. Top soil should be stockpiled separately and used for finish grading around the structure.
- 6.2 *Backfill Placement* – The Contractor may begin backfilling of wet well as soon as the concrete has been allowed to cure and the forms removed. Place in layers of not more than 12 loose measure inches and mechanically tamped to at least 95 percent Modified Proctor Density. Flooding will not be permitted. Backfill shall be placed in such a manner as to prevent any wedging action against the structure.