**POTABLE WATER STORAGE TANK SPECIFICATION**

***GLASS COATED BOLTED STEEL STORAGE TANK***

**PART 1- GENERAL**

* 1. SECTION INCLUDES

This section includes furnishing and erecting an RTP (rolled, tapered panel) \_\_\_\_\_\_\_\_ gallon bolted steel reservoir and necessary piping and appurtenances, per AWWA D-103 specifications.

* 1. Qualifications of Tank Supplier
1. The Engineer’s selection of a glass/vitreous enamel coated bolted steel tank is predicated on a thorough examination of design criteria, construction methods, and optimum coating for resistance to internal and external tank corrosion. Deviations from the specified design, construction or coating details will not be permitted.
2. The bidder shall offer a new tank structure as supplied from a **U.S.A.** manufacturer specializing in the design, fabrication and erection of bolted steel water tanks. All steel used will be produced in the U.S.A.

1. The tank shown on the contract drawings and specified herein shall be an AQUA AGT 2020™ glass coated, RTP bolted tank as manufactured by Tank Connection.
2. Erection of the structure is to be by the tank manufacturer or approved contractor. The contractor shall be fully responsible for the entire installation including tank erection, and the ultimate water tightness of the complete installation.
3. Strict adherence to the standards of design, fabrication, erection, product, quality, and long-term performance, established in this Specification will be required by the Owner and Engineer.
4. Tank suppliers wishing to pre-qualify shall submit the following to the

Engineer/Owner for consideration:

G. Typical structure drawing(s)

1. List of tank materials, appurtenances and tank coating technical specifications.
2. Resume of job installation superintendent.
3. The contractor shall have the experience and knowledge necessary to furnish and erect the highest quality tank possible. Under no circumstances shall an inexperienced contractor be awarded the project. The contractor shall be fully responsible for the entire installation including appurtenances and the final product.
4. If an aluminum geodesic dome roof system is required, the dome erector must have installed, and had in satisfactory service, at least one clear span aluminum dome with a diameter equal to or larger than the unit specified, and shall submit evidence of such with his bid proposal and/or pre-bid submittal.
5. The components of the tank that come in contact with stored water shall be certified to meet ANSI/NSF Additives Standard No. 61.
	1. Submittal Drawings and Specifications
6. Construction shall be governed by the Owner’s drawings and specifications showing general dimensions and construction details. There shall be no deviation from the drawings and specifications, except upon written order from the Engineer.
7. The bidder is required to furnish, for the approval of the Engineer and at no increase in contract price, 5 sets of complete specifications and construction drawings for all work not shown in complete detail on the bidding drawings. A complete set of structural calculations shall be provided for the tank structure and foundation.
8. When approved, two sets of such prints and submittal information will be returned to the bidder marked “**APPROVED FOR CONSTRUCTION”** and these drawings will then govern the work detailed thereon. The approval by the Engineer of the tank supplier’s drawings shall be an approval relating only to their general conformity with the bidding drawings and specifications and shall not guarantee detail dimensions and quantities, which remains the bidder’s responsibility.

**PART 2. DESIGN CRITERIA**

2.01 Tank Size

1. The AQUA AGT 2020™ bolted RTP steel tank shall have a nominal diameter of \_\_\_\_ft. with a nominal sidewall height (to roof eave) of \_\_\_\_ft.

2.02 Tank Capacity and Elevation

1. Tank working capacity shall be \_\_\_\_\_\_\_\_\_\_\_ gallons (nominal).
2. Freeboard space in top of tank shall be a minimum of \_\_\_\_\_ft.
3. Tank base elevation shall be at \_\_\_\_\_\_\_ft.

2.03 Tank Design Standards

1. The materials, design, fabrication and erection of the bolt together tank shall

conform to the AWWA Standard for “Factory-Coated Bolted Steel Tanks For Water Storage” – ANSI/AWWA D103, latest addition.

1. The tank coating system shall conform solely to Section 12.4 Glass Coatings of ANSI/AWWA D103, latest addition.
2. All materials furnished by the tank manufacturer, which are in contact with stored water, shall be certified to meet ANSI/NSF Additives Standard No. 61. Certification of a coating type alone will not be sufficient to meet this requirement. Certification of a distributor, and not the tank or coating manufacturer, will not be accepted.
3. The RTP (rolled, tapered panel) bolted tank design shall have lap joint

connections on both vertical and horizontal shell seams. American Petroleum Institute (API 12B) flanged panel tank design will not be acceptable.

**PART 3. MATERIAL SPECIFICATIONS**

3.01. Plates and Sheets (**Note: All steel used shall be produced in U.S.A.)**

1. Plates and sheets used in the construction of the tank shell, tank floor and

tank roof, shall comply with the minimum standards of AWWA D103, Section 4.4.

1. Design requirements for high strength steel shall be per AWWA D103.
2. The annealing effect created from the glass coated firing process shall be considered in determining ultimate steel strength. In no event shall a yield strength greater than 50,000 psi be utilized for calculations as detailed in AWWA D103, Sections 5.4 and 5.5.

3.02 Rolled Structural Shapes

1. Material shall conform to minimum standards of ASTM A36, A992 or ANSI 1010.

3**.**03 Horizontal Wind Stiffeners

1. When allowed, the use of web truss stiffeners will be limited to a maximum of two horizontal seams. Web stiffeners will utilize a hot dipped galvanized coating.

3.04 Bolt Fasteners

1. Bolts used in tank lap joints shall be ½ - 13 UNC-2A rolled thread, and shall

meet the minimum requirements of AWWA D103, Section 2.

B. Bolt Material

* SAE J429 Grade 8

C. Bolt Finish – JS1000 or mechanically deposited finish

1. Bolt Head Encapsulation
2. High impact polypropylene copolymer encapsulation of entire bolt head.
3. Resin shall be stabilized with an ultraviolet light resistant material such that the color shall appear black. The bolt head encapsulation shall be certified to meet the ANSI/NSF Standard 61 for indirect additives.
4. All bolts on the vertical tank wall shall be installed such that the head portion is located inside the tank, and the washer and nut are on the exterior.
5. Bolt lengths shall be sized to achieve a neat and uniform appearance. Excessive threads extending beyond the nut after torqueing will not be permitted.

3.05 Sealants

1. The lap joint sealant shall be a one component, moisture cured, polyurethane compound. The sealant shall be suitable for contact with potable water and shall be certified to meet ANSI/NSF Additives Standard 61 for indirect additives.
2. The sealant shall be used to seal lap joints and bolt connections and edge fillets for sheet notches and starter sheets. The sealant shall cure to a rubber-like consistency, have excellent adhesion to the glass coating, low shrinkage, and be suitable for interior and exterior use.

C. Sealant curing rate at 73°F and 50% RH

D. Tack-free time: 6 to 8 hours

1. Final cure time: 10 to 12 hours
2. Neoprene gaskets and tape type sealer shall not be used in liquid contacting surfaces.

**PART 4. AQUA AGT 2020™ COATING PROCESS**

4.01 Cleaning

1. Following the fabrication process, sheets and tank components shall be thoroughly washed and rinsed.
2. Washing shall be with Coral COR CLENE 16 and 140°F water.
3. The PH level shall be monitored and maintained at 10 to 12.
4. Rinsing shall be in a two stage booth and ambient temperature fresh water in the second stage.
5. All water shall be removed from sheets and tank components with forced air at ambient temperature.

4.02 Surface Preparation

1. Tank panels shall be steel grit blasted on both sides to the equivalent of an SSPC-10 profile. Anchor profile shall be 1.0 mil minimum. Sand blasting and chemical pickling of panels will not be allowed.
2. Edge preparation: All panel edges to be mechanically beveled and flame coated with 316 stainless steel (at 1.5 mils minimum) prior to glass coating application.
	1. Glass/Vitreous Enamel Coating System
3. After edge preparation, cleaning and blasting, all tank panels to be coated with Aqua AGT 2020™ coating system.
4. All glass/vitreous enamel coating systems allowed must meet or exceed AWWA D103 and EN 15282 requirements.
5. Wet enamel slip application allowed only, applied in a controlled environment.
6. The panels will be fired at a minimum 1500° F in strict accordance with manufacturer’s quality control procedures. Manufacturer to maintain ISO 9001 Quality System Certification.
7. Two-fire application required for an average mil thickness of 10-14 mils.

4.04 Inspection

1. The manufacturer’s quality system shall be ISO 9001 certified.
2. All testing performed to meet AWWA D103 and EN 15282 requirements.
3. Coated panels to be inspected for mil thickness (Mikrotest or equal.)
4. All inside sheet surfaces shall be holiday free. A dry volt test using a minimum of 1100 volts is required.
5. The adherence of glass coating to the steel shall be tested in accordance with ASTM B916-01.

4.05 Packaging

1. After cool down and inspection, all approved panels will be protected from damage prior to shipment.
2. Heavy paper or plastic foam sheet shall be placed between each panel to prevent sheet abrasion during shipment.
3. Panels to be wrapped in a heavy mil, black poly reinforced plastic and then banded to special designed wood pallets to prevent movement during shipment.
4. Shipment from the factory to the jobsite shall be by truck, hauling the tank components exclusively.

**PART 5. ERECTION**

5.01 Foundation

1. The compacted engineered fill is not part of this contract and is not installed by the tank contractor.
2. The tank foundation is part of this contract.
3. The tank foundation shall be designed by the tank manufacturer.
4. Tank footing design shall be based on \_\_\_\_ psf soil bearing capacity as determined by a geotechnical engineer. Copies of the soil report to be provided in the bid documents.
5. The floor design is of reinforced concrete with an embedded glass coated starter ring per the manufacturer’s design and in accordance with AWWA D103-09, section 13.4.6.
6. Leveling the starter ring shall be required and the maximum differential

elevation within the ring shall not exceed one-eight (1/8) inch, nor exceed one-sixteenth (1/16) inch within any ten (10) feet of length.

1. Place one butyl rubber elastomer water stop seal strip on the inside surface

of the starter ring below concrete floor line. Place one bentonite impregnated water seal below the butyl rubber seal. Install materials in accordance with tank manufacturer’s instructions.

5.02 Sidewall Structure

1. Field erection of glass coated bolted steel tank shall be in strict accordance with the procedures outlined by the manufacturer, using factory trained erectors.
2. Particular care shall be taken in handling and bolting of the tank panels to prevent coating damage. Prior to a liquid test, the Engineer may visually inspect all surface areas.
3. An electrical leak test shall be performed during erection using a wet sponge

low voltage leak detection device. All electrical leak points found on the inside surface shall be repaired in accordance with manufacturer’s published touch up procedures.

1. The placement of sealant on each panel may be inspected prior to placement of adjacent panels. However, the Engineer’s inspection shall not relieve the bidder from his responsibility for liquid tightness.
2. No backfill shall be placed against the tank sidewall without prior written

approval and design review of the tank manufacturer. Any backfill shall be placed according to the strict instructions of the tank manufacturer.

5.03 Roof

A. Clear-Span Aluminum Geodesic Dome

1. The roof shall be constructed of non-corrugated triangular aluminum panels. Panels are sealed and firmly clamped in an interlocking manner to a fully triangulated aluminum space truss system of wide flange extrusions, thus forming a dome structure.
2. The dome shall be clear span and designed to be self-supporting from

the periphery structure with primary horizontal thrust contained by an integral tension ring. The dome dead weight shall not exceed 3 pounds per square foot of surface area.

1. The dome and tank shall be designed to act as an integral unit. The

tank shall be designed to support an aluminum dome roof including all specified live loads.

1. Materials:

a. Triangulated space truss: 6061-T6 aluminum struts and gussets.

b. Triangulated closure panels: .050”t 3003-H16 aluminum sheet.

c. Tension ring: 6061-T6 aluminum.

d. Fasteners: 7075-T73 anodized aluminum or series 300 stainless

 steel.

e. Sealants and gaskets: gunnable silicone and neoprene rubber.

f. Dormers, doors, vents and hatches: 6061-T6, 5086-H34 or 3003-H16

 aluminum.

5.04 Appurtenances

A. Pipe Connections

1. Overflow piping shall be \_\_\_\_\_ inches nominal diameter schedule 10 carbon steel coated externally or schedule 80 Gray PVC (UV resistant). A 90 degree internal weir elbow with external downcomer pipe and flap valve shall be provided for the overflow.
2. Inlet and outlet connections shall conform to the sizes and locations specified on the plan sheets.
3. Outside Tank Ladders
4. An outside tank ladder shall be furnished and installed as shown on the contract drawings.
5. Safety cage and step-off platforms shall be fabricated of galvanized

steel or aluminum. Ladders shall be equipped with a hinged lockable entry device.

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1. Access Doors
2. One manway shall be provided as shown on the contract drawings in accordance with AWWA D103.
3. The manhole opening shall be a minimum of 24 inches in diameter. The access door (shell manhole) and the tank shell reinforcing shall comply with AWWA D103, Sec. 7.1.
4. Roof Vent
5. A properly sized vent assembly in accordance with AWWA D103 shall be furnished and installed above the maximum water level of sufficient capacity so that at maximum design rate of water fill or withdrawal, the resulting interior design pressure / vacuum will not exceed +2.0 / -0.5 ounces per square inch.
6. The overflow pipe shall not be considered to be a tank vent.
7. The vent shall be so designed in construction as to prevent the

entrance of birds and/or animals by including a 4 mesh (1/4” opening size) galvanized screen. If required by the contract drawings, a 16 mesh (1/16” opening size) galvanized screen will be installed to prevent the entrance of insects. However, if the tank is located in an area where heavy frost is common during the winter months an additional pressure / vacuum relief valve must also be provided.

G. Roof Hatch

1. The manufacturer shall furnish a roof opening which shall be placed near the outside tank ladder and which shall be provided with a hinged cover and a hasp for locking. The opening shall have a clear dimension of at least thirty (30) inches square. The opening shall have a curb, at least four (4) inches in height and the cover shall have a downward overlap of at least two (2) inches.

H. Roof Perimeter Guardrail

1. Perimeter guardrail and toeboard around the perimeter of the deck

shall be provided and installed as specified on the project drawings.

I. Liquid Level Indicator

1. A liquid level indicator with stainless steel float, number board and high visibility target shall be provided and installed as detailed on the project drawings.

J. Identification Plate

1. Manufacturer’s nameplate shall list the tank serial number, tank

diameter and height, and maximum design capacity. The nameplate shall be affixed to the tank exterior sidewall location approximately five (5) feet from the grade elevation.

**PART 6. INSTALLATION**

6.01 Installation Process

1. Field erection of the bolted steel tank will be in strict accordance with

manufacturer’s procedures using factory trained and certified erectors.

1. Particular care will be taken to protect the glass coated panels

from damage during field installation.

1. Tank to be constructed utilizing synchronized (hydraulic screw) jacking process, which keeps construction crews at grade level for safety and point access quality control.
2. Any coating damage will be repaired per manufacturer’s recommendations.
3. No backfill shall be placed against the tank sidewall during or after the construction process.

6.02 Field Testing

A. Hydrostatic

1. Following completion of erecting and cleaning of the tank, the structure shall be tested for liquid tightness by filling tank to its overflow elevation.
2. The contractor in accordance with the manufacturer’s recommendations shall correct any leaks disclosed by this test.
3. The owner shall furnish water required for testing at the time of tank erection completion, and at no charge to the tank erector. Disposal of test water shall be the responsibility of the owner.

**PART 7. DISINFECTION**

7.01. Standards

1. The tank structure shall be disinfected at the time of testing in accordance with AWWA Standard C652-02 “Disinfection of Water Storage Facilities” using chlorination method number two. Disinfection shall be performed by a competent water treatment contractor.
2. Disinfection shall not take place until tank sealant is fully cured (see Sect.3.5.3).

**PART 8. TANK MANUFACTURER’S WARRANTY**

1. The tank manufacturer shall include a warranty on tank materials and workmanship for a specified period. As a minimum, the warranty shall provide assurance against defects in material, coatings and workmanship for a period of two (2) years. The warranty on the tank interior lining will be five (5) years.

 **\*\* END OF SECTION \*\***