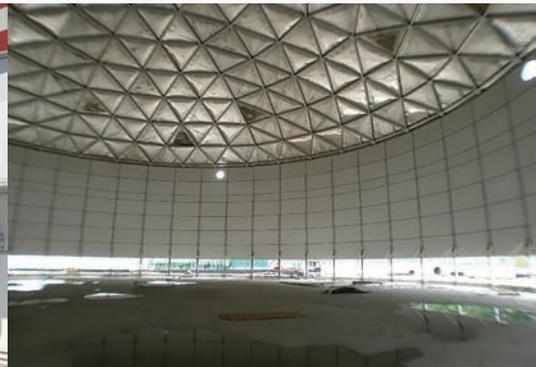


# LIQ Fusion 7000 FBE™ ... A Stronger System Than Glass!



**LIQ Fusion 7000 FBE™** technology is here! In bolted storage tanks, Tank Connection offers the next generation of unmatched coating performance.

**LIQ Fusion 7000 FBE™** is designed as the replacement for glass/porcelain enamel coatings.



**Once you compare the facts on each system, you will find that Tank Connection's LIQ Fusion 7000 FBE™ coating system is a stronger system than glass:**

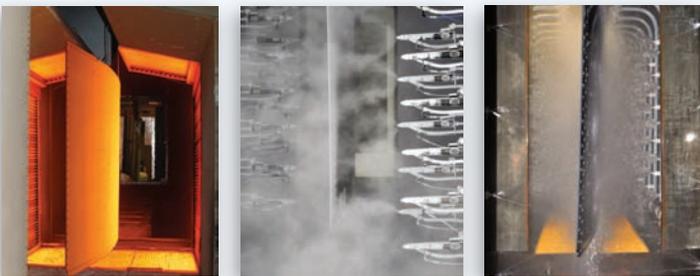
	<b>LIQ Fusion 7000 FBE™ – Lab Testing*</b>	<b>Glass/Vitreous Enamel – Lab Testing*</b>
<i>Bolted sidewall panel protection</i>	Excellent	Excellent (with exception of panel edges and bolt holes)
<i>Edge protection</i>	Excellent, coated LIQ Fusion FBE™	Poor, as shipped from the factory (covered with mastic sealant in the field)
<i>Bolt holes</i>	Excellent, coated LIQ Fusion FBE™	Poor, as shipped from the factory (covered with mastic sealant in the field)
<i>Coating Thickness</i>	7-11 mils	8-13 mils (must be verified due to high shop defect rate)
<i>pH</i>	3-14 (depending on product and temperature)	3-11 (depending on product and temperature)
<i>Corrosion Resistance (ASTM B-117)</i>	Excellent	Excellent
<i>Temperature Tolerance</i>	200° F water, Dry 300° F	140° F water, Dry N/A
<i>Coating to substrate</i>	LIQ Fusion FBE™ (advanced fusion bond technology)	Glass /vitreous enamel technology
<i>Flexibility</i>	Passes 1/8" mandrel test	None (cannot be field repaired)
<i>Impact</i>	160 in/lbs	4 in/lbs
<i>History</i>	New technology with 5-7 years testing	Old technology with history of spalling
<i>Salt Spray</i>	Passes 7500 hours	Passes 7500 hours
<i>Liquids</i>	Submerged structural components are coated with LIQ Fusion FBE™	Submerged structural components are galvanized
<i>Holiday Free Coating</i>	Yes	No
<i>Cathodic protection</i>	Not required	Required (due to uncoated edges and bolt holes)
<i>Sealant</i>	Mastic	Mastic
<i>Panel Size</i>	~ 5' tall x 10' long	~ 4.5' tall x 9' long
<i>Construction Type</i>	Horizontal RTP (rolled, tapered panel)	Horizontal RTP (rolled, tapered panel)

\*Note: Production panels (not lab panels) were utilized for testing.

## The Fusion Process...Unmatched Coating Performance!

Liquid Storage	DFT*	Range (min/max)
Interior Coating: LIQ FUSION 7000 FBE™	7 mils nominal	7-11
Exterior Primer: EXT FUSION 5000 FBE™	3 mils nominal	3-5
Exterior Topcoat: EXT FUSION SDP™	3 mils nominal	3-5

\*DFT – Dry film thickness



- Chemical Wash, Rinse & Dry
- SSPC - SP10 Blast (Steel Shot Media)
- Interior LIQ Fusion 7000 FBE™ Application
- Exterior EXT Fusion 5000 FBE™
- Initial Coating Cure @ 350° F
- Infrared Convection
- Exterior EXT Fusion 5000 SDP™
- Oven Crosslink Cure @ 400° F
- Testing & Final Inspection

### Standard Colors:



### Premium Colors:



The colors shown are printed approximations. The exact color can be viewed using RAL standard color samples.

## GLASS Review & History

Glass coatings/porcelain enamel/vitreous enamels have a history of fabrication deficiencies in bolted tank fabrication. Over its product history, very few of these deficiencies have been corrected:

A1. **In the late 1990's, spalling issues plagued Northern locations that were subject to continuous freezing cycles.** Eventually, TIO<sub>2</sub> was introduced into the glass formulations, which improved the bubble structure of the glass coating released. To date, high factory reject rates still exist, which promotes that the coating thickness and discontinuities (holidays) should be verified in the field on all panels.

B2. **Panel edges and bolt hole areas remain deficient and problematic in glass coated bolted storage tanks.** To date, no good solution has been developed to coat the panel edges on glass bolted tanks, due to the applied "enamel slip" that creeps away from edges and bolt holes. Over its product history, a number of coatings and manufacturing processes have been tried without success. One manufacturing process promotes the application of a sprayed stainless to the panel edges. This process provides no verifiable measurement, nor can it be visually inspected on panel edges prior to glass application. The reality in the field is that bolted glass panel edges will rust quickly if left uncovered after field assembly. The practiced remedy in the field is to cover-up the edge deficiency with mastic sealant during field installation. This is accomplished by troweling mastic sealant down and over the lap joint panel edges. This not only creates an aesthetic issue, which can be viewed on any glass tank installation in the field, but it also creates a tank performance issue down the road.

C3. **Glass tanks can never be recoated.** What appears to be a product strength is actually its major weakness in today's market of advanced coating technologies. Old painted carbon steel tanks and even older riveted steel tanks still exist in the field today that are over 100 years old. Based on periodic inspection and recoating when required, a bolted steel tank will have an expected service life of over 40+ years, as recognized by AWWA. The reality of good maintenance and recoating (when required) is that a bolted epoxy coated steel tank can easily provide field service in excess of 60-80+ years.

The picture shown is a 28 year old glass tank that cannot be recoated in the field. As you will note, this product is quickly approaching the end of its service life. This product does not fit the classification of high quality, long life storage containment.

With the EN 15282 specification being promoted internationally for a 25 year glass tank design, this is where the glass tank market is headed in the future. A light tank design that maintains a reduced service life and then requires replacement. . . because it can't be recoated. At Tank Connection, we consider this to be an unacceptable performance standard.

D4. **Mastic sealant should only be used to seal a lap joint bolted panel assembly.** It should not be used as a field coating. Mastic sealant is designed to provide a permanent seal between overlapping bolted panel assemblies. When it is used as an external coating to cover up a product deficiency or coating damage in the field, a tank performance issue has been created. Over time, excessive mastic sealant externally exposed to UV and the elements will contract, exposing the bolted panel edges. To counter this product deficiency, the panel edges on glass coated tanks will need to be recovered with mastic on a 7-10 year cycle. The cost for applying additional sealant to cover the panel edges should be calculated into the life cycle cost of bolted glass coated storage tanks.



B2



C3



D4

E5. **Glass coatings have NO impact resistance.** In the field, it is common that glass is damaged during tank assembly (hair-line and micro-fractures), routine maintenance and external debris impact. The impact of one rock or hard object released from a mower will easily crack the glass and ruin the panel. Once the glass is cracked, the panel will either require replacement in the field or if the damage area can be isolated, it can be covered-up with mastic sealant. Again, another poor remedy used routinely. More often, the damage goes unnoticed and unchecked. This is why cathodic protection is required with all glass coated storage tanks. In today's market of advanced coating technologies, covering-up coating deficiencies in the field with sealants should be considered an unacceptable performance standard.

F6. **In glass coated bolted storage tanks, the only components typically coated with glass are the sidewall panels.**

There is a common misconception in the industry that a glass coated tank, includes glass on all component piece assemblies, which is not the case. All structural shapes and nozzles are galvanized, which leads to an interesting question to ask. If submerged galvanized components are acceptable in your potable water or wastewater system, then why not specify a galvanized tank? Galvanized tanks are the lowest quality and least expensive storage tanks available in today's market. (A storage coating system can only be considered as strong as its weakest link.) Tank floor construction typically utilized is concrete. The deck assembly typically utilizes an aluminum dome. (Steel deck and floor assemblies are available in vitreous enamel, but only if specified.)

G7. **To minimize cracking the glass during field assembly, each ring of bolted panels is offset vertically as the tank is built.** The end result is a vertical alignment that moves counter clockwise from the bottom of the tank up. Aesthetically, this is reviewed by clients as a "leaning tank" especially when vertical tank accessories (piping, ladders, etc.) are installed. Structurally, it is not an issue.

H8. **As noted under lab testing, glass has NO flexibility and steel storage tanks routinely expand and contract.** The area subject to cracking under steel expansion and contraction is the glass at the bolt heads. This is a common problem that becomes a quality and field performance issue.

I9. **Glass coated tanks continue to become lighter in design, in lieu of better in design.** Light design storage tanks are evidenced by the number of galvanized web trusses utilized on the outside of the tank. Web trusses, commonly referred to as "webbies" are an inexpensive erector's set of bolt together, bent steel bands that form a truss shape. This component's sole function is to control failure of shell buckling (flattening of shell) during wind conditions.

Based on a shortened tank design life, some suppliers are now supplying webbies from the top of the tank to the bottom of the tank... making the tank sidewall as thin as possible. This specification is driven by manufacturers that want to sell lighter tank designs at higher margins. To knowledgeable engineers, webbies are considered cheap reinforcement bands.

Other aesthetic issues are also starting to surface, relative to the use of galvanized webbies. Globally, these galvanized bands are staining the exterior of storage tanks . . . a combination of the galvanization exposed to rain and the surrounding environment. Although this is only considered an aesthetic issue, it remains an issue that could be corrected by designing glass storage tanks with adequate plate thickness. A light design storage tank is a bad choice for any client wanting to install permanent facilities with an expectation of extended service life.



G7



H8



I9

## LIQ Fusion 7000 FBE™ Review & History – CORRECTS ALL GLASS DEFICIENCIES

The performance data as shown above shows that the fusion system is a stronger system than glass in bolted tank construction. The LIQ Fusion 7000 FBE™ system developed by Akzo Nobel and Tank Connection, corrects all of the glass deficiencies identified under A1 – I9 above. Please note:

A1. **LIQ Fusion 7000 FBE™ has no spalling issues.**

B2. **LIQ Fusion 7000 FBE™ has no edge or bolt hole coverage issues.** FUSION powder coat technology provides complete wrap-around in bolt holes and on panel edges.

C3. **At Tank Connection, our LIQ Fusion 7000 FBE™ is an extended service life coating system, which can be recoated down the road.** This option is not available for glass coated tanks. Once they reach the end of their service life, glass tanks must be replaced. Based on routine maintenance and recoating, the service life of a well designed bolted steel fusion tank can easily be extended to ~60-80+ years. A Tank Connection fusion bond storage tank will have a field service life of 1.5-2 times that of glass tanks offered today.

D4. **Mastic sealant is utilized as it was intended . . . permanently sealing “lap joint” bolted panel assemblies.** The mastic sealant that seals the bolted panels coated with fusion technology never require the edges to be recovered at a later date.

E5. **The impact resistance of LIQ Fusion technology is 40 times greater than that of glass.** LIQ Fusion 7000 FBE™ technology is today's technology.

F6. **In Fusion Bond technology, all tank components including sidewall panels and structural shapes are coated with the LIQ Fusion 7000 FBE™ system.** Flexibility now exists to utilize a steel or concrete bottom. Relative to deck design, flexibility now exists to utilize a fusion coated deck or utilize an aluminum dome.

G7. **Preferred aesthetics with vertically aligned panels.** No coating damage is incurred due to symmetrical panel alignment.

H8. **As noted under lab testing, LIQ Fusion 7000 FBE™ has significant flexibility compared to glass.** LIQ Fusion incurs no cracking of coating at the bolt hole seams during expansion or contraction.

I9. **We design storage tanks, utilizing the correct plate thickness for long life, low maintenance storage.** Tank Connection is the only tank manufacturer worldwide that designs, manufactures and installs all four types of steel storage tanks including Bolted RTP, Field-Weld, Shop-Weld & Hybrid Tank designs.

Today's bolted RTP design, provided by Tank Connection, coated with LIQ Fusion 7000 FBE™ is the #1 bolted tank design and coating available worldwide. Our storage tank designs and coatings correct the deficiencies of glass coated storage tanks offered in the marketplace today.



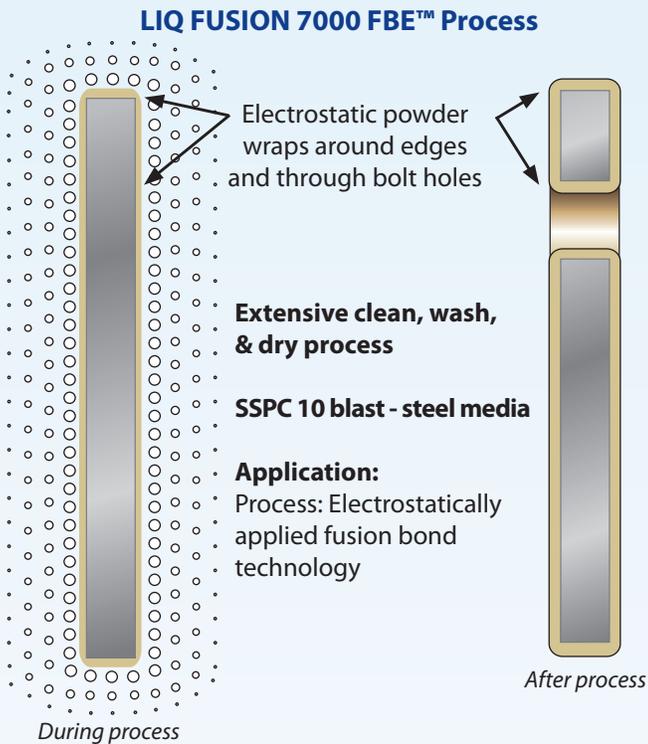
B2



G7

## The Fusion Process:

LIQ Fusion FBE™ (advanced fusion bond technology) is an electrostatically applied fusion powder coat process. Automatic, programmed powder spray guns direct the flow of powder, deposition rate, pattern size, shape and density of the spray. The powder particles are electrostatically charged during application and the bolted tank components moving on an automated line are negatively charged. The process guarantees powder deposited on all edges, in bolt holes and



across the panel uniformly. Advancing through a corridor of high temperature ovens, the powder undergoes a fusion bond process.

The end result is a molecularly bonded layer of LIQ Fusion FBE™ that forms a non-conductive component surface.

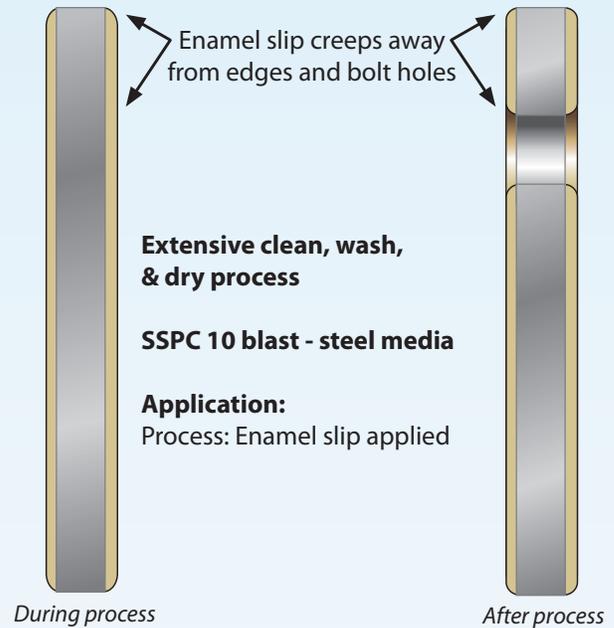
Tank Connection is the exclusive provider of this proprietary process, maintaining the only fusion powder coat line certified by Akzo Nobel for bolted storage tanks worldwide.

LIQ Fusion 7000 FBE™ is a stronger system than glass lined coatings and is 100% factory holiday free. Additionally, it is superior to all other powder coating processes offered in bolted tank construction worldwide.

## The Glass Process:

After the spalling issues of the 1990's, TiO2 was introduced into the formula to improve bubble structure. In essence, the smaller bubble structure was more spall resistant.

### GLASS - Vitreous Enamel Process



As the glass coating is fired, a bubble structure is maintained in the glass. Bubble structure is needed in glass fused to steel for expansion, contraction and flexion of steel during installation.

Glass Process - Inconsistent process due to continuous recipe and manufacturing changes over product history. Latest formulations have been developed to utilize a one-fire process through furnace. Previous two-fire process provided improved performance over today's process.

Manufacturer's claims of virtually "holiday free" must be verified due to high factory reject rate. Glass coating provides good performance on tank sidewall panels. Past and current edge coating processes remain poor.

The deficiencies of glass have now become pronounced due to advanced coating technologies that address glass deficiencies.



In December 2008, Tank Connection brought online another new 85,000 square ft. manufacturing facility for bolted RTP (rolled, tapered panel) tank construction. This new facility is state-of-the-art and commands the top position in bolted tank manufacturing worldwide.

## **At the Tank Connection Affiliate Group, we offer:**

- The #1 bolted tank design selected worldwide
- The #1 LIQ Fusion 7000 FBE™ coating system available worldwide
- The ONLY “Fusion Coating” line certified for bolted tank fabrication worldwide
- The BEST bolted storage tank systems available worldwide
- The TOP TEAM of industry experts in dry and liquid storage applications
- GOLDEN RULE customer service on every project

## **You can't procure or specify “BETTER THAN THE BEST”!**

Move over to Tank Connection's RTP Design & LIQ Fusion 7000 FBE™ and “*Get Connected*” with the premier bolted storage tank available in the world today!



Tank Connection, LLC

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