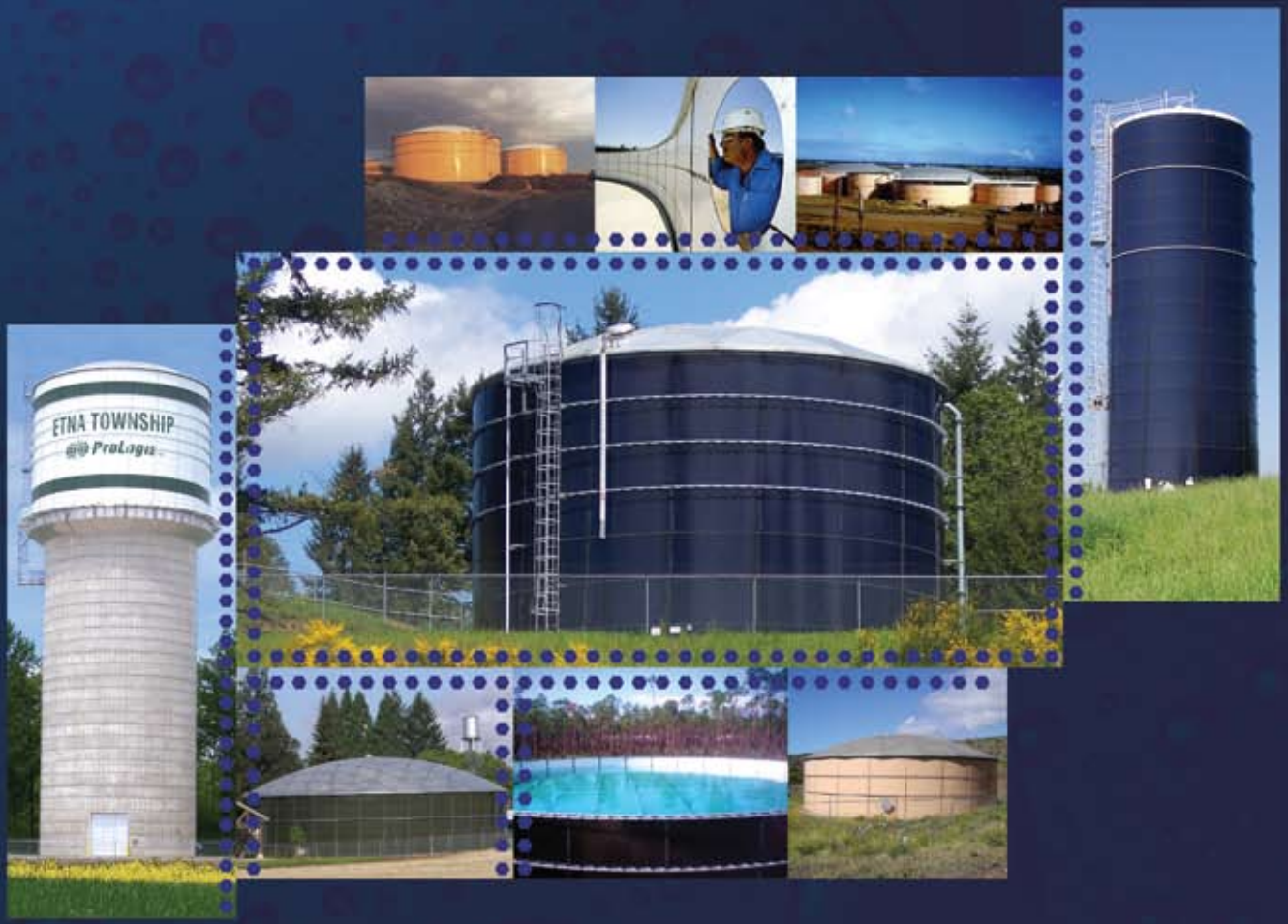
AQUASTORE®

Tanks & Domes

Glass Tanks with a Heart of Steel™



Glass Tanks with a Heart of Steel™

Not All Liquid Storage Tanks Are Created Equal

Engineered Storage Products Company (ESPC) has a long and storied history of turning raw steel into the finest storage tanks available.

Our unique glass-fused-to-steel technology was introduced more than 50 years ago for dry bulk agricultural applications. Today, ESPC is dedicated to the design, fabrication and installation of glass-fused-to-steel sectional tanks. More than 100,000 glass-fused-to-steel tanks have been installed in over 70 countries around the world.

The glass-fused-to-steel technology was introduced to the liquid storage market in the mid-1970's as "Aquastore®." After more than 30 years of proven performance, Aquastore tanks have become the preferred choice for potable water storage and many other liquid applications. With tens of thousands of satisfied customers, Aquastore tanks are "engineered" to be the very best.

Glass-fused-to-steel has become the premium water and liquid storage technology leader. Aquastore owners choose glass-fused-to-steel technology over other tank designs for several reasons:

- **Lowest maintenance requirements over tank life**
- **Greater lifetime value versus welded or concrete tanks**
- **Faster construction – Easy assembly without cranes or special equipment**
- **Expandable to accommodate future requirements**
- **Available in diameters from 11 feet (3.3 m) to 204 feet (62.2 m) and capacity from 20,000 gallons (75 cu m) to over 6 million gallons (22,700 cu m)**
- **Specific tank designs, options and accessories to meet customer needs**

ESPC designs and manufactures a wide range of tanks in an ISO 9001:2000 certified facility to meet a wide range of standards, including AWWA D103 – Bolted Steel Water Storage Tanks, AISC, IBC, NBCC, FM and NFPA Standard 22.

An Aquastore tank means assurance.

Assurance you will receive the highest engineered quality, best service, **longest product life and greatest value** in liquid storage tanks.

▲ *Sludge stabilization and sludge storage facility.*

▲ *Multiple potable ground storage tank facility.*

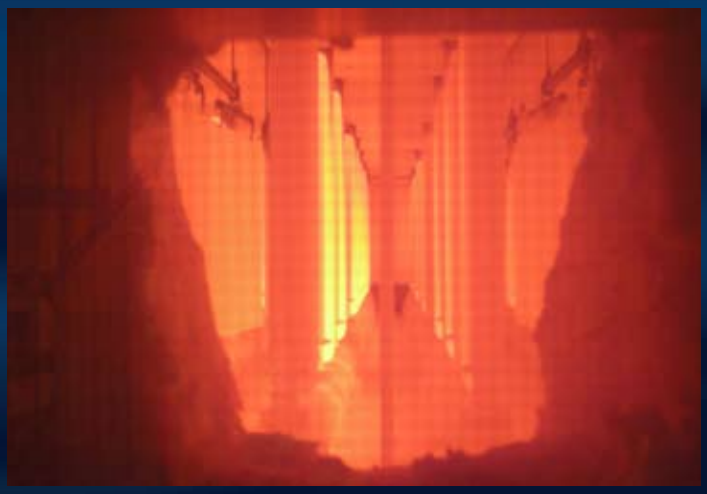
Assurance

▲ *Holiday testing.*

Glass-Fused-to-Steel
Factory "Engineered" Technology

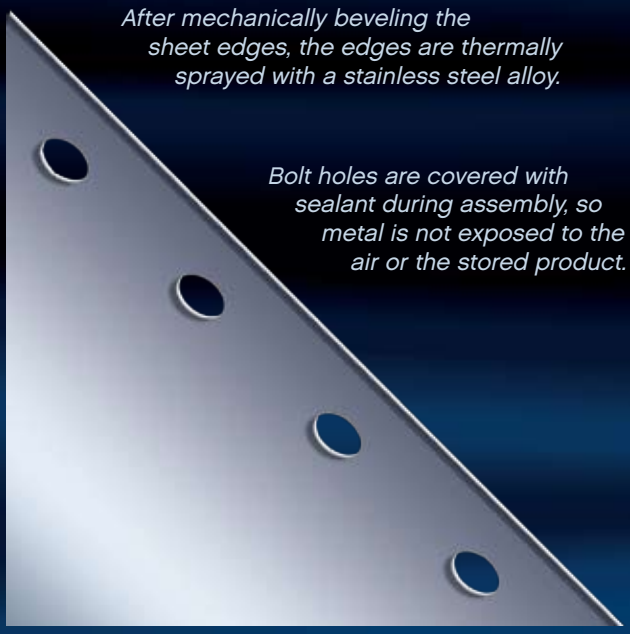
Glass-fused-to-steel is the premium technology in the tank market. Glass coating's physical properties are specially suited to municipal and industrial storage applications. The factory-applied silica glass coating on Aquastore tanks forms a hard, inert barrier for both the interior and exterior tank surfaces to guard against weather and corrosion. Glass-fused-to-steel is impermeable to liquids and vapors, controls undercutting caused by corrosion and offers excellent impact and abrasion resistance. The color won't fade or chalk and most graffiti can easily be removed. **It never needs painting!**

- A multi-step process is the heart of the glass-fused-to-steel technology system
- Fabricated sheets are grit blasted to a uniform, near white surface
- Proprietary formulations of borosilicate, minerals, water and clays are blended into a sprayable slurry called "slip"
- After inspection, the slurry is fused to the steel sheets at temperatures above 1,500° F (815° C) to produce the distinctive glossy Aquastore glass finish
- The molten glass reacts with the profiled steel surface to form an inert, inorganic chemical and mechanical bond



▲
State-of-the-art porcelain enameling furnace installed in 2006.

A new, state-of-the-art porcelain enameling furnace was installed at ESPC in 2006. The world's largest and highest efficiency porcelain enamel furnace, it improves quality, saves energy, increases production and speeds delivery of glass-fused-to-steel products to customers. In all, five advanced temperature control zones regulate the coating process to produce extremely high quality sheets every time.



After mechanically beveling the sheet edges, the edges are thermally sprayed with a stainless steel alloy.

Bolt holes are covered with sealant during assembly, so metal is not exposed to the air or the stored product.

Edgecoat® Protection
ESPC's proprietary Edgecoat® process thermally sprays the sheet edge with a protective stainless steel alloy before the glass finish is applied to the entire sheet for maximum protection.

▲
Glass-fused-to-steel panels on the production line.

Peace of Mind

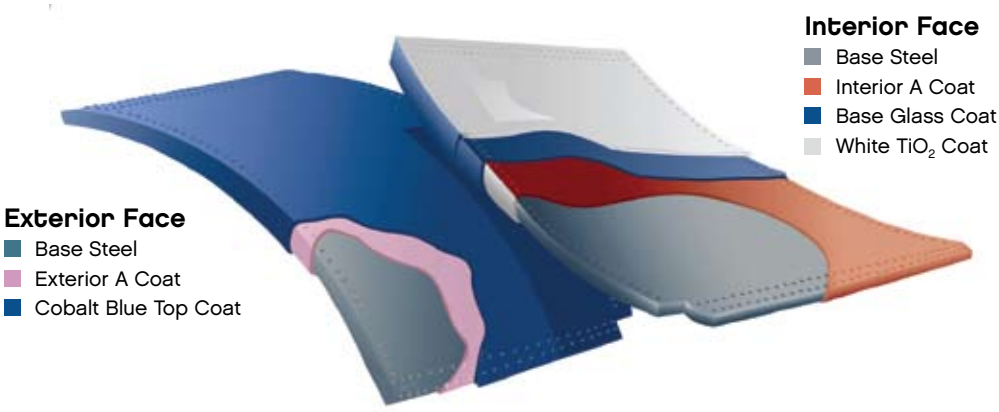
Vitrium Technology

ESPC's unending commitment to product improvement has resulted in the development of ESPC's newest glass innovation – Vitrium™. This coating combines the outstanding chemical and physical resistant properties of titanium-enhanced glass with a highly engineered, ultra-fine glass bubble structure. This process results in high performance glass-fused-to-steel technology. Vitrium features and benefits include:

- Tough TiO_2 glass formulations provide longer life
- Electrostatic base coat application ensures consistent quality
- Maximum coating effectiveness without requiring increased coating thickness
- Unique process technologies provide factory certified "holiday-free" sheets
- Process efficiencies lead to competitive pricing
- Ideal for both cold and hot climates

Glass frit is specially formulated to produce the distinctive cobalt blue Aquastore glass coating.

Physical Properties – Glass-Fused-to-Steel Vitrium Technology



Inside Sheet Color	White
Outside Sheet Color	Cobalt Blue, Desert Tan, Forest Green, Sky Blue, White
Nominal Thickness	**Interior:** 10-18 mils, 260-460 microns **Exterior:** 7-15 mils, 180-380 microns
Service Range	140° F (60° C) @ 2-11 pH-subject to verification, depending on specific products stored
Abrasion Resistance	Taber-8 mg loss (CS-17, 100g, 100 cycles)
Elasticity	Young's Modulus 12 x 10^6
Permeability	Impermeable to gases and liquids within normal operating temperature ranges
Thermal Conductivity	20.4 BTU in/hr ft^2 °F
Cleanability	Smooth, inert, glossy, anti-stick
Hardness	6.0 Mohs
Adherence	Over 5,000 psi to base steel
Impact Resistance	24 inch-lb.
Corrosion Resistance ASTM B-117	Excellent, virtually unaffected by most waste waters, brines, sea water, sour crude, salt spray, organic and inorganic chemicals

From the Top Down, Faster Construction

Every Aquastore tank is factory engineered to customer specifications. Since all components are manufactured in the factory and easily assembled, Aquastore tanks can be installed in many types of weather conditions when field-welded steel and concrete tanks cannot. Tanks are assembled from the top down by factory trained building crews with a jacking system that progressively elevates the structure without the need for expensive cranes. Erection crews can stay safely on the ground. This construction method enables rapid, logical progress for timely completion.

Floors

Aquastore floors can be glass-fused-to-steel or reinforced concrete. A flat steel floor is lined with Aquastore glass-fused-to-steel sheets. When using concrete, Aquastore walls are embedded in the foundation. Authorized Aquastore Dealers can provide site preparation and foundation installation.

Sidewalls

Sidewall erection is completed using a series of specially designed motorized jacks. Each glass-fused-to-steel panel is bolted and sealed into place. Upon completion, the motorized jacks raise the sidewall ring so subsequent rings can be erected. Erecting an Aquastore tank does not require heavy-load cranes or lifting equipment on-site. This unique installation process allows for construction in remote regions as well as metropolitan areas.

Roofs or Domes

All Aquastore roofs or domes are free span (do not require columns to support) and are installed on the tanks in the initial phase of construction. Glass-fused-to-steel roofs are available up to 31' in diameter and aluminum geodesic domes are available in all sizes.

Glass-fused-to-steel roofs are manufactured with hard tooling and include radially sectioned steel panels. The roofs are assembled using the same sealant and bolting techniques as the sidewall panels.

Aquastore free span, aluminum geodesic domes are available for the complete range of Aquastore tanks. They are constructed with non-corrugated triangular aluminum panels interlocked by a truss system with wide flange extrusions. Domes can be designed to each individual customer's needs, taking into account wind, snow loadings, seismic and design codes.

Sealants

Aquastore tanks feature sealants specifically formulated for chemical resistance appropriate to the application. Each sealant is inspected on a batch-by-batch basis to ensure quality. The sealant is suitable for contact with potable water and is certified to meet ANSI/NSF Additives Standard 61 for indirect additives and is chlorine resistant. Sealants cure to a rubber-like consistency, have excellent adhesion to the glass coating, low shrinkage and are suitable for interior and exterior use.

Tank Economics and Lifetime Value

All tanks are not created equal! The glass-fused-to-steel technology in an Aquastore tank delivers greater lifetime value than welded or concrete tanks. When you add up tank benefits over its life cycle, the advantages of Aquastore are hard to beat. It is simply the best quality, lowest maintenance and most flexible tank available.

Consider these advantages:

- **NEVER NEEDS PAINTING**
- Minimal maintenance required over tank life
- Will not corrode or rust
- A guaranteed tank performance warranty
- Turn-key services by an Authorized Aquastore Dealer from approval drawings to tank testing
- No need for cranes or other large equipment for erection
- Erect Aquastore in remote, secluded locations
- Minimize lost construction days due to weather delays or field-applied coatings
- Design Aquastore for future expansion or relocation
- Remove most graffiti easily

The biggest economic advantage is that an Aquastore tank never needs painting! The budgeted dollars that may be used to repair a concrete tank or repaint a welded tank every 8 – 12 years can be diverted to other municipal or industrial needs.

Concrete tanks are expensive, involve long construction periods, need lots of room to build and are not always “maintenance free”. Design specifications allow for a small level of leaking, and some level of cracking is basically expected. Concrete tanks usually take longer to construct than an Aquastore.

Welded tanks can have long lead and construction times. They are limited by external environmental factors when being erected and field-coated. Welded tanks can have high maintenance costs and must be painted multiple times over their life cycle. Their warranty is typically only one year after installation.

The biggest economic advantage is that an Aquastore tank never needs painting!

Low Maintenance

Tank Designs to Meet Specific Application Needs

Ground Storage Tank

Composite Elevated

Standpipe

Leachate

Clarifier

Biodiesel

Sludge Storage/Mixing

Anaerobic Digestion

Ethanol

Authorized Aquastore Dealers

Authorized Aquastore Dealers offer a turn-key package to customers providing service, support and expertise from start to finish. In addition to selling and erecting an Aquastore tank, dealer sales and service specialists can offer the following:

- **Value engineering – total cost analysis**
- **Tank configuration and layout data**
- **Budgeting**
- **Product engineering specifications**
- **Design criteria assistance**
- **Tank layout drawings**
- **Approval drawings**
- **Certified drawings**
- **Site preparation and layout**
- **Tank construction scheduling**
- **Structural calculations**
- **Tank testing and commissioning**
- **Tank inspection and repair**
- **Maintenance services**
- **Relocation or expansion**
- **Concrete work**
- **Pipe work *(inlet, outlet, overflow, decant, etc.)***
- **Insulation *(spray foam, battens, etc.)***
- **Dome installations**
- **Turn-key tank construction**
- **After sale service**

An Aquastore tank requires minimal maintenance over its life cycle and ESPC Authorized Dealers can provide complete service packages tailored to your application needs. Most importantly, the glass-fused-to-steel technology experiences little environmental impact and never needs painting, saving thousands of dollars over time.

Commitment

Turn-key package from site preparation to completed and tested tank.

AQUASTORE
Tanks & Domes

Features & Accessories

The Aquastore basic system consists of:

- **Glass-fused-to-steel sidewalls**
- **Ladder, cage and platform**
- **Cathodic protection**
- **Gravity vent**
- **Glass-fused-to-steel roofs or aluminum geodesic Aquadomes**
- **Roof, dome and sidewall manways**
- **Overflow pipes**
- **Hardware and sealant required to assemble the tank**

1 Cathodic Protection

An Aquastore tank's cathodic protection system uses sacrificial anodes to protect the reinforcing bars, mitigate corrosion and provide protection to internal submerged surfaces of the tank. It is incorporated into the Aquastore tank's warranty.

2 Gravity Vent

Aquastore tank gravity vents are designed to allow for air exchange during filling and emptying. They are equipped with corrosion-resistant bird and insect screens.

3 Ladder, Cage and Platform

Aquastore tank ladders are constructed of aluminum rails and rungs with hot-dip galvanized cages and step off platforms. Ladders with locking safety cage doors are available.

4 Sidewall Manways

Aquastore tank manways are designed in accordance with AWWA D103 Standards. They are 24 inches (61 cm), 30 inches (76 cm) or 36 inches (91 cm) in diameter and are manufactured with hot-dip galvanized or stainless steel.

5 Hardware and Sealants

The hardware and sealants for Aquastore assembly are supplied with each order. Specific types, such as chlorine resistant sealants or hardware with protective covers, are made for the individual application. Heavy duty plastic bolt caps are also available for added protection.

Additional options and accessories.

Additional accessories are available to meet use and specification needs. Accessories include:

- Colors
- Caps and sealer
- Nozzles
- Baffles
- Roof walkways, railings and staircases
- Level indicators

Colors

Aquastore glass coatings are available in standard cobalt blue or four other exterior colors. Forest green, sky blue, desert tan or white colors are available. Inquire for custom colors. Interior color is always white.

Exterior Colors:

Cobalt Blue

Sky Blue

Tan

Forest Green

White

*Colors represented are not exact reproductions but are good representations of available colors.

Caps and Sealer

Durable plastic bolt caps offer added protection against weather and corrosion. For specialized applications, sealer alternatives are available.

Nozzles and Baffles

Nozzles and baffles are available depending on tank use and specifications. Engineering flexibility allows these accessories to be incorporated into overall tank design.

Walkways, Railings and Staircases

An option to the standard ladder and cage is a walkway and staircase. Aquastore walkways are hot-dip galvanized steel and are appropriate for situations when regular overhead tank access is required. Both walkways and staircases are available from your local Authorized Dealer.

Level Indicators

Durable and functional, the liquid level indicator is a utilitarian option that can be installed as part of the assembly operation.

Service

"Best in Industry" Warranty

For more than 50 years, Engineered Storage Products has offered the most comprehensive manufacturer's warranty in the industry. The field-proven performance history of Aquastore tanks is one more indication that our products are built to last.

Authorized Aquastore Dealers

ESPC delivers Aquastore tanks through a network of Authorized Aquastore Dealers. These organizations and their sales representatives are available to discuss project requirements from inception to completion. Experience in your region and application knowledge are valuable during all stages, from project development to specification to erection to the completed and tested tank.

Pricing, budget estimates, foundation layouts, project scheduling, approval drawings and foundation construction are just a few of the areas where Authorized Dealers can help. Our customers deal with one source from start to finish, including service after installation. Dealers are trained to provide superior customer service.

Find your nearest Aquastore dealer in the dealer locator section at **www.aquastore.com.**

AQUASTORE® Tanks & Domes

Glass Tanks with a Heart of Steel™

ENGINEERED STORAGE PRODUCTS COMPANY

345 Harvestore Drive, DeKalb, Illinois 60115
Phone: 815-756-1551, Fax: 815-756-7821
www.aquastore.com
e-mail: **sales@aquastore.com**

© 2008. Aquastore and Edgecoat are registered trademarks of Engineered Storage Products Company.
Vitrium is a trademark of Engineered Storage Products Company.