



# Global Tank Specialists



CST INDUSTRIES, INC.





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CST Industries, Inc. specializes in the design and supply of pre-engineered steel storage tanks. Engineered Storage Products Company (ESP), a division of CST Industries, manufactures tanks using glass-fused-steel and thermosetting modified epoxy powder lining systems, the most advanced innovations available in steel tank lining technology. CST has been dedicated to the design, fabrication and innovation of steel tanks since 1893. A worldwide leader, the company has built water and wastewater tanks in over 125 countries and has an extensive network of sales offices, agents and distributors around the globe.

# A world leader in factory lined steel tanks.

ESP is noted for its excellence in glass-fused-to-steel technology and over the past decade has introduced a steady stream of glass tank innovations for the Aquastore® and Permaglas® brands. Research and development has also been ongoing in thermosetting modified powder epoxy coating systems for TecStore® brand tanks.

## Why build a factory lined steel tank?

ESP tanks provide the highest quality and lowest maintenance coating systems in the liquid storage tank industry. They are specifically engineered for exceptional corrosion control, abrasion resistance and a longer service life.



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

**Higher Quality** - Factory applied glass-fused-to-steel and thermo-set baked-on modified epoxy tank lining systems outperform air cured factory and field applied coatings.

**Faster** – Modular pre-engineered steel tanks and dedicated fabrication plants offer quick delivery and easier assembly.

**Lower cost** – Competitive pricing and reduced maintenance costs provide significantly lower life cycle costs and subsequent savings over the tank life.

**Flexibility** – Capacities from 13 m<sup>3</sup> to 45,000 m<sup>3</sup>. A wide variety of configurations are available.

**Proven** – Over a century of experience in designing, engineering and fabricating steel tanks. Over 250,000 tanks in over 125 countries worldwide!

## Liquid Tank Application chart

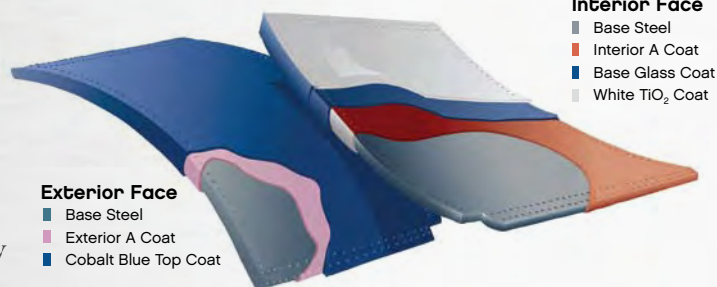
	Power Generation	Water Supply	Water Treatment	Wastewater Treatment	Irrigation Systems	General Industry	Agriculture
Potable water		✓	✓			✓	
Industrial process water	✓	✓	✓			✓	✓
Salt water			✓				
Brine/Borehole water			✓		✓		
Clearwell tank		✓	✓				
Chlorine contact		✓	✓				
Brackish water		✓	✓		✓		
Deionized water	✓	✓	✓			✓	
Demineralized water	✓	✓	✓			✓	
Reverse osmosis water	✓	✓	✓			✓	
Desalinated water	✓	✓	✓		✓	✓	
Ultrapure water	✓		✓			✓	
Boiler feed water	✓						
Buffer/Balance tanks				✓			
Aerobic digester				✓			
Anaerobic digester				✓			✓
Clarifier tank			✓	✓			
Trickling filter tank			✓	✓			
Settling tank			✓	✓			
Aeration tank			✓	✓			
Landfill leachate				✓			
Fire protection water	✓					✓	
Treated effluent water	✓		✓	✓	✓		
Irrigation water					✓		✓
Liquid manure				✓	✓		✓
Lime slurry			✓	✓			
Carbonate slurry			✓	✓			

# Glass-Fused-to-Steel Factory “Engineered” Technology

Glass-fused-to-steel is the premium lining technology in the storage and process tank market. The glass lining’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 it never needs repainting.



A new, state-of-the-art porcelain enameling furnace was installed at ESP in 2006. The world’s largest porcelain enameling furnace, it improves efficiency and produces extremely high quality sheets every time.



## Vitrium Technology

New process technology has resulted in the development of ESP’s newest glass innovation – Vitrium™. This internal glass lining combines the outstanding chemical and physical resistant properties of Titanium Dioxide (TiO<sub>2</sub>) saturated glass with a highly engineered ultra-fine glass structure surface to create a high performance glass-fused-to-steel technology. Vitrium features and benefits include:

- Tough TiO<sub>2</sub> 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

In 2007, Vitrium EN™ was introduced. Vitrium EN is compliant with the full range of Euro Norm testing requirements under the EN15282 specification for glass-fused-to-steel tanks. This new innovation provides significant benefits in economy and performance in the marketplace.

## Modified Epoxy Tank Lining Technology

For some applications, organic linings are preferred. Modified epoxy tank lining technology is used for pure water, ultra-pure water, de-mineralized water, de-ionised water and ultra-filtration water applications. It is also preferred for very large capacity storage tanks due to its improved economics when coating the required thicker steel. For these applications, CST offers its TecStore product line with Kuo-Lon® thermosetting modified epoxy lining system. Kuo-Lon is a new generation thermosetting epoxy powder coating that combines outstanding chemical resistance with exceptional physical properties in a thermally cured tank lining system. It is formulated specifically for such products as highly treated water, potable water, wastewater, sewage, brines and chemicals where its inertness and corrosion resistance are a clear advantage over other coating systems.\*

TecStore is especially suited for heavy industrial facilities such as power or desalination plants, for ultrapure water applications and for large scale potable and service water storage.

Glass lined wall sheet edges are mechanically beveled and 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.

\*For full details please request the Kuo-Lon technical specifications.

## EN15282 Glass Analysis Summary

The recently implemented standard EN15282:2007 – *Vitreous and porcelain enamels – Design of bolted steel tanks for the storage or treatment of water or municipal or industrial effluents and sludges* provides comprehensive glass-fused-to-steel performance and testing standards. There are four classifications of glass specified in EN15282 with different grades specified for different applications. This chart summarizes the glass coating requirements and specifications. CST's glass linings fully comply with the EN 15282 specification.

Property	Class 1	Class 2	Class 3	Class 4
EN15282 Application Categories ( <i>See Note 1</i> )	Thermophilic/pasteurization digester-roof & top ring	<ul style="list-style-type: none"> <li>Industrial effluent process &amp; treatment</li> <li>Thermophilic/pasteurization digester cylinders</li> <li>Municipal mesophilic digester roof &amp; top ring</li> <li>Liquid Leachate</li> <li>Municipal sludge treatment roof &amp; top ring</li> <li>Borehole/brackish &amp; sea water</li> </ul>	<ul style="list-style-type: none"> <li>Municipal sludge treatment cylinders</li> <li>Municipal sludge &amp; sludge cake storage</li> <li>Filter tanks</li> <li>Potable water (DWI listed Reg 31)</li> <li>Potable water (ANSI/NSF 61 listed)</li> </ul>	<ul style="list-style-type: none"> <li>Municipal mesophilic digester cylinders</li> <li>Storm &amp; Fire water</li> </ul>
Other Applications (not listed in EN15282) These applications are suitable for glass fused to steel coatings, and the Class designated is based on ESP Aquastore 50+ year's experience, testing and general industry acceptance.	Specialist applications which cannot be met by the lower class glass formulations	Higher purity water, including RO, DI and De-min produced water – but not ultra pure applications where LSI less than -6.	Industrial service water	Agriculture (animal waste) slurry
Aquastore® (ESP) Permaglas® Coatings – the designated glass formulations fully comply with the relevant standards and testing for each of the classifications noted. Customer orders should indicate the Class of Service required for their specific application.	Glass 97 EN®	Vitrium EN™	Vitrium EN™ (Vitrium EN™ in full compliance with all Class 2 requirements is also supplied for Class 3 and Class 4 applications.)	
Resistance to chemical corrosion by citric acid at room temperature; EN 14483 1:2004 Clause 9, tested monthly or with each batch	Class AA	Class AA	Class A+	Class A
Resistance to chemical corrosion by sulphuric acid at room temperature; EN 14483 1:2004 Clause 10, tested monthly or with each batch	Class AA	Class A+	Test not required	Test not required
Resistance to chemical corrosion by hydrochloric acid at room temperature; EN 14483 1:2004 Clause 11, tested monthly or with each batch	Class AA	Class A+	Test not required	Test not required
Resistance to chemical corrosion by boiling citric acid; EN 14483 2:2004 Clause 10, tested annually	Max mass loss after 2.5 hours 0.75 gm/m <sup>2</sup>	Max mass loss after 2.5 hours 1.5 gm/m <sup>2</sup>	Max mass loss after 2.5 hours 3.0 gm/m <sup>2</sup>	Max mass loss after 2.5 hours 5.0 gm/m <sup>2</sup>
Resistance to chemical corrosion by boiling hydrochloric acid – Vapour phase; EN 14483 2:2004 Clause 12, tested annually	Max mass loss after 7 days 7.0 gm/m <sup>2</sup>	Max mass loss after 7 days 8.0 gm/m <sup>2</sup>	Test not required	Test not required
Resistance to chemical corrosion by boiling distilled or demineralized water; EN 14483 2:2004 Clause 13, tested annually	<ul style="list-style-type: none"> <li>Vapour phase max mass loss after 48 hours 5.0 gm/m<sup>2</sup></li> <li>Liquid phase max mass loss after 48 hours 2.5 gm/m<sup>2</sup></li> </ul>	<ul style="list-style-type: none"> <li>Vapour phase max mass loss after 48 hours 7.5 gm/m<sup>2</sup></li> <li>Liquid phase max mass loss after 48 hours 2.5 gm/m<sup>2</sup></li> </ul>	<ul style="list-style-type: none"> <li>Vapour phase test not required</li> <li>Liquid phase max mass loss after 48 hours 2.5 gm/m<sup>2</sup></li> </ul>	<ul style="list-style-type: none"> <li>Vapour phase test not required</li> <li>Liquid phase max mass loss after 48 hours 5.0 gm/m<sup>2</sup></li> </ul>
Resistance to chemical corrosion by standard detergent solutions; EN 14483 3:2004 Clause 9, tested annually	Max mass loss after 24 hours 2.5 gm/m <sup>2</sup>	Max mass loss after 24 hours 5.0 gm/m <sup>2</sup>	Test not required	Test not required
Resistance to chemical corrosion by hot sodium hydroxide; EN 14483 4:2004 Clause 9, tested annually	Max mass loss after 24 hours 6.0 gm/m <sup>2</sup>	Max mass loss after 24 hours 6.0 gm/m <sup>2</sup>	Max mass loss after 24 hours 7.0 gm/m <sup>2</sup>	Max mass loss after 24 hours 7.0 gm/m <sup>2</sup>
Resistance to thermal shock; ISO 2747, tested annually	300° C	300° C	Test not required	Test not required
Resistance to impact: Pistol test; ISO 4532, tested monthly or with each batch – Max damage < 2 mm in diameter after 24 hours	40 N force	40 N force	20 N Force	20 N force
Determination of the resistance to abrasion; ISO 6370 2, tested annually	Max mass loss 45 gm/m <sup>2</sup>	Max mass loss 45 gm/m <sup>2</sup>	Test not required	Test not required
Scratch hardness of surface according to Mohs; EN 101, tested monthly or with each batch	Mohs 5	Mohs 5	Mohs 5	Mohs 5
Adherence level; EN 10209:1996 Annex D, tested monthly or with each batch	Class 2	Class 2	Class 2	Class 2
Enamel Thickness; EN ISO 2178:1995, frequency determined in accordance with ISO 2859 1 ( <i>See Note 3</i> )	300µm - 500µm	260µm - 460µm	200µm - 400µm	160µm - 360µm
Defects – Inside Surface – No discontinuities, test frequency is every panel	EN 14430:2004 Test A Test voltage 1500v	EN 14430:2004 Test A Test voltage 1100v	EN 14430:2004 Test A Test voltage 900v	EN ISO 8289:2001 Method A 9 volt wet sponge test 90kΩ
Defects – Outside Surface, maximum visible defect size 1 mm, test frequency every panel	Visual inspection ( <i>see Note 2</i> )	Visual inspection ( <i>see Note 2</i> )	Visual inspection ( <i>see Note 2</i> )	Visual inspection ( <i>see Note 2</i> )
Defects – Outside Surface, maximum 3 visible defects per m <sup>2</sup> total panel area, test frequency every panel	Visual inspection ( <i>see Note 2</i> )	Visual inspection ( <i>see Note 2</i> )	Visual inspection ( <i>see Note 2</i> )	Visual inspection ( <i>see Note 2</i> )
Colour – Outside Surface, Colour and colour tolerances shall be agreed between interested parties, frequency determined in accordance with ISO 2859 1	Inspection using a colour comparator approved prior to production by the vitreous enameller	Inspection using a colour comparator approved prior to production by the vitreous enameller	Inspection using a colour comparator approved prior to production by the vitreous enameller	Inspection using a colour comparator approved prior to production by the vitreous enameller
Notes: 1. Consult with supplier for suitability for specific applications. All applications subject to concentration and temperature considerations of the stored liquid. 2. It is permissible, when agreed between the contracting parties, to rectify defects with a material approved by the vitreous enameller for the purpose, applied according to the rectification material manufacturer's instructions. 3. Internal lining only – EN15282 allows manufacturer's standards for external glass coating thickness.				

# Engineering and Specifications

CST tanks incorporate design and material standards that are proven in thousands of tanks all over the world.

## Engineering Design Standards

Aquastore and TecStore designs incorporate recognized standards assuring high quality and long-lasting industrial service liquid storage tanks. All CST product lines incorporate a minimum 30 year design life analysis performed in conformance with British Standard 7543:2003 (Guide to Durability of Buildings and Building Elements, Products and Components). While EN15282 is the standard design for international projects, CST also regularly designs to other international codes and standards including those noted below.

Standard	Authorization Body	Title/Description	Primary Applications	Primary Regions of Use
ANSI/AWWA D103	American National Standards Institute - American Water Works Association	Factory-Coated Bolted Steel Tanks for Water Storage	Municipal (Public) Water Storage Tanks	North America
FM- 4020/4021	Factory Mutual	Approval Standard for Ground Supported, Flat Bottom Steel Tanks for Fire Pump Suction	Fire Protection Water Storage Tanks	Worldwide
NFPA-22	National Fire Protection Association	Water Tanks for Private Fire Protection	Fire Protection Water Storage Tanks	Worldwide
AISC	American Institute of Steel Construction	Manual of Steel Construction	Water Storage Tanks	North America
EN15282	CEN-European Committee for Standardization	Vitreous and porcelain enamels- Design of bolted steel tanks for the storage or treatment of water or municipal or industrial effluents and sludges	Municipal & Industrial Water & Wastewater Storage Tanks	Europe Middle East Africa Asia Pacific Islands Central & South America

## The CST Difference

Our network of distributors, agents and sales offices can offer the service, support and expertise you need to build a tank 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. You can be assured you will receive the highest engineered quality, best service, longest product life and greatest value in liquid storage tanks.



# Material Specifications

Aquastore and TecStore material specifications for municipal and industrial service liquid storage tanks ensure the highest quality and longest tank life. Materials are carefully selected and inspected for conformance to rigid specifications.

**Plates and Sheets** – Steel plates and sheets used in the construction of the tank shell, tank floor (when supplied) and tank roof (when supplied), shall comply with the following minimum standards.

- Mild strength steel -

ASTM A1011 Grade 30 - maximum allowable tensile stress 19,800 psi (13,652 N/cm<sup>2</sup>)

- High strength steel

ASTM A1011 Grade 50 – maximum allowable tensile stress 33,000 psi (22,753 N/cm<sup>2</sup>)

ASTM A1011 Grade 60 – maximum allowable tensile stress 39,600 psi (27,303 N/cm<sup>2</sup>)

ASTM A1011 Grade 80 – maximum allowable tensile stress 52,800 psi (36,405 N/cm<sup>2</sup>)

*(Note: Aquastore sheets are Grades 30 and 50 (after firing), TecStore sheets are Grades 30, 60 and 80.)*



**Rolled Structural Shapes** - Material shall conform to minimum standards of ASTM A36 or AISI 1010.

**Horizontal Wind Stiffeners** - Intermediate horizontal wind stiffeners shall be of the “web truss” design with extended tail to create multiple layers of stiffener, permitting wind loads to distribute around tank. Web truss stiffeners shall be of steel with hot dipped galvanized coating.

**Bolt Fasteners** - Bolts used in tank lap joints shall be ½” (nominal 12mm) – 13 UNC-2A rolled threads. Bolt Material shall conform to the following:

- 1” (nominal 25mm) and 1-1/4” (nominal 32mm) bolt lengths – SAE J429 Grade 5—Tensile strength 120,000 psi minimum (82,737 N/cm<sup>2</sup>), Proof Load 85,000 psi minimum (58,605 N/cm<sup>2</sup>), Allowable shear stress 30,000 psi (20,684 N/cm<sup>2</sup>)
- Greater than 1-1/4” (nominal 32mm) bolt length – SAE J429 Grade 8 – Tensile strength 150,000 psi minimum (103,421 N/cm<sup>2</sup>), Proof Load 120,000 psi minimum (82,737 N/cm<sup>2</sup>), Allowable shear stress 40,000 psi (27,579 N/cm<sup>2</sup>)
- Bolt finish – Zinc, mechanically deposited, 0.002 inches minimum (50 microns) – under bolt head, on shank and threads.
- Bolt head encapsulation – The entire bolt head up to the splines on the shank shall be encapsulated with high impact polypropylene copolymer. Resin shall be stabilized with an ultraviolet light resistant material such that the colour shall appear black. The copolymer shall be certified to meet the ANSI/NSF Standard 61 for indirect additives for drinking water supply applications.

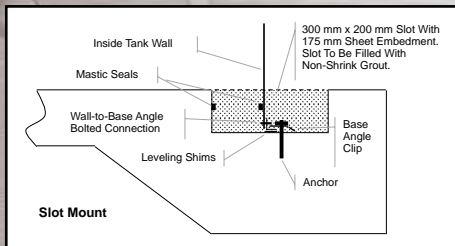
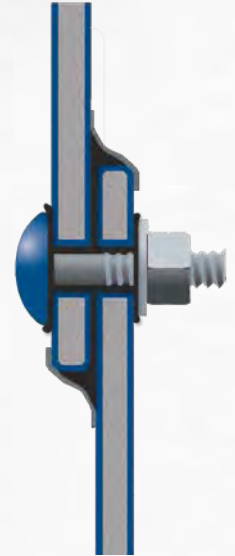
**Sealers** - The lap joint sealant shall be a one component, moisture cured, polyurethane compound. The sealant shall be used to seal lap joints and bolt connections as well as for completing edge fillets for sheet notches and starter sheets. The sealant shall cure to a rubber-like consistency, have excellent adhesion to the tank lining system, low shrinkage and be suitable for interior and exterior use. Alternate sealants such as polysulfide and silicone compounds, may be used depending on the products to be stored.

# Constructing A Glass-Fused-to-Steel Tank

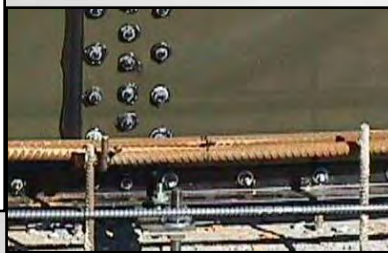
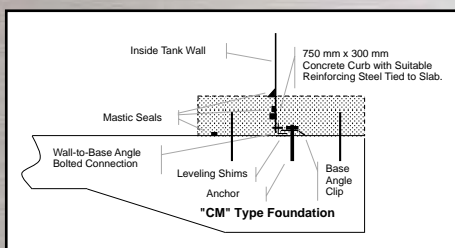
Every CST tank is factory engineered to customer specifications. Since all components are manufactured in the factory and easily assembled, CST tanks can be installed in many types of situations when field-welded steel and concrete tanks cannot. Tanks are most commonly assembled from the top down by trained building crews using a jacking system thus eliminating the need for cranes. Alternative assembly methods (scaffold build) and professionally supervised local building crews are frequently used for lower profile tanks.

## Foundation arrangements

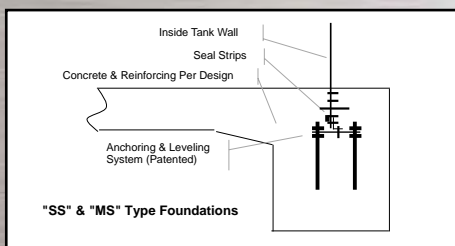
Depending on tank specifications, the typical foundation will be one of the following:



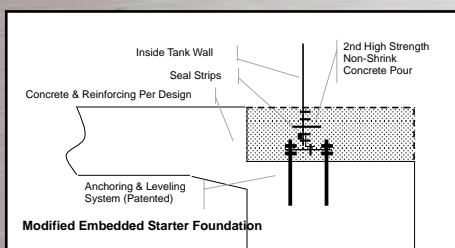
**Slot Mount:** Used for lower profile tanks, particularly suited for wastewater treatment applications.



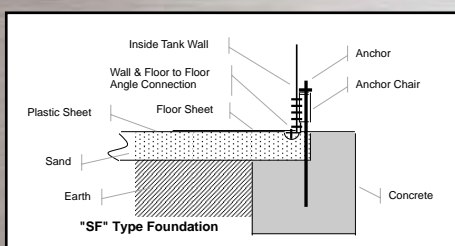
**Curb Mount:** Used for lower profile tanks, well suited for tower mounted storage tanks.



**Embedded Starter:** Used for larger municipal and industrial applications and higher seismic applications.



**Modified Starter:** Combines Embedded Starter for large tank and higher seismic features with Slot Mount convenience.



**Steel Floor:** Used in applications where a steel floor is required, for example highly purified water, vegetable oils, petroleum products, etc.



# Installation Sequence and Construction

The following construction sequence is typical of a medium to large ESP water storage tank with an embedded starter type foundation.



**Excavation**



**Ring Wall and Compaction**



**Set Foundation Ring**



**Set Slab Reinforcing Steel**



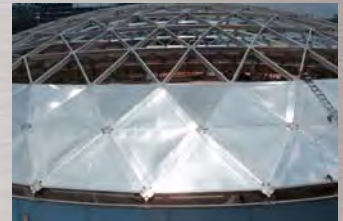
**Install Water Seals**



**Pour and Complete Concrete Floor Slab**



**Set Up Jacks and Start Dome**



**Assemble and Complete Dome Structure/Panels**



**Install Panels**



**Apply Sealer**



**Jack and Raise Tank to Install Panel Rings**



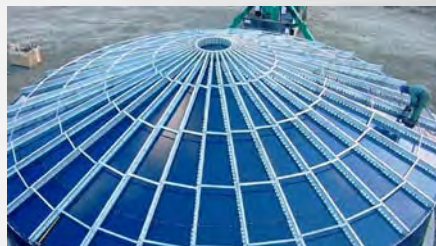
**Completed Tank**

## Roof options

CST tanks can be adapted to accept a wide range of roof options. Each roof has specific features and benefits which make them unique and suitable for different specifications and project requirements. Typical roof options include:



**Fabric Roof:** Economical, for low profile tanks in low wind areas



**Gas Tight Roof:** High quality, clear span for anaerobic digesters



**Geodesic Dome:** Top-of-the-line, clear span, non-corroding all aluminum structure



**Knuckle Roof:** Available on tanks up to model 31 diameter



**Open Top:** Standard for sewage and wastewater treatment applications



**Ribbed Roof:** Economical, easy to install – for low profile tanks

# Tank Designs to Meet Specific Application Needs



**Industrial Wastewater**



**High Purity Water**



**Standpipe**



**Leachate**



**Clarifier**



**Biodiesel**



**Sludge  
Storage/Mixing**



**Anaerobic  
Digestion**



**Industrial Service Water**



**Potable Water**

# Additional options and accessories.

## 1 - Cathodic Protection

An Aquastore tank's cathodic protection system where fitted 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

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

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.

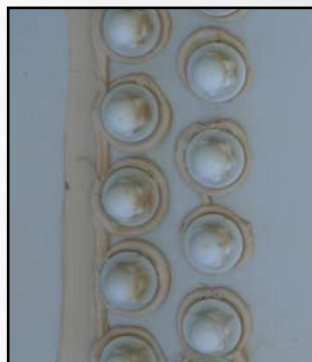
## 4 - Sidewall Manways

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.



## Caps and Sealer

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



## Walkways, Railings and Staircases

An option to the standard ladder and cage is a walkway and staircase. CST walkways are hot-dip galvanized steel and are appropriate for situations when regular overhead tank



## Nozzles & Baffles

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



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.

## Services

Aquastore and TecStore tanks are marketed globally through a network of CST Sales Offices, Distributors and Agents. A full range of services is available including:

- Value engineering-total cost analysis
- Tank configuration and layout data
- Budget prices – material and erection
- Product engineering specifications
- Design criteria assistance
- Foundation layouts
- Tank general arrangement layout drawings
- Firm prices - material and erection
- Tank construction scheduling
- Approval drawings
- Structural calculations
- Certified drawings
- Tank construction or supervision
- Tank testing and commissioning
- Sectional tank inspection, repair & maintenance



**When it comes to glass-fused-to-steel or modified epoxy coated tanks, you get the highest engineered quality, best service, longest product life and greatest value from CST Industries, Inc. Contact CST Industries International Service Group for all your global tank requirements.**

**CST Industries, Inc.**  
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## Sales and Service Offices

**Latin America:** Guadalajara, Mexico; Monterrey, Mexico; Buenos Aires, Argentina

**Europe:** Alfreton, Derbyshire, England

**Middle East:** Jebel Ali Free Zone, United Arab Emirates

**Asia:** Singapore; Hanoi, Vietnam

**CST INDUSTRIES, INC.**

**AQUASTORE®**  
Tanks & Domes  
Glass Tanks with a Heart of Steel™

**tecStore®**

**Permaglas®**

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HEIGHT

Model Height Reference  
 Actual Wall Height (mm) - From Top of Top Angle to Bottom of Bottom Angle  
 # of Rings in tank

Engineered Storage Products Company  
 Aquastore® and TecStore™ Tank Capacity Chart  
 Capacities in Cubic Meters

Model	Sheets	Actual Diameter (mm)	liters/mm Wall Height	5	9	14	19	23
				1	2	3	4	5
202	72	61 428	2 964	4 365	8 505	12 644	16 784	20 923
204	73	62 282	3 047	4 487	8 743	12 998	17 253	21 509
207	74	63 135	3 131	4 611	8 984	13 357	17 729	22 102
210	75	63 988	3 216	4 737	9 228	13 720	18 212	22 703
213	76	64 841	3 302	4 864	9 476	14 088	18 700	23 313
216	77	65 694	3 390	4 993	9 727	14 461	19 196	23 930
218	78	66 548	3 478	5 123	9 981	14 839	19 698	24 556
221	79	67 401	3 568	5 255	10 239	15 222	20 206	25 189
224	80	68 254	3 659	5 389	10 500	15 610	20 721	25 831
227	81	69 107	3 751	5 525	10 764	16 003	21 242	26 481
230	82	69 960	3 844	5 662	11 031	16 401	21 770	27 139
232	83	70 813	3 938	5 801	11 302	16 803	22 304	27 805
235	84	71 667	4 034	5 942	11 576	17 210	22 845	
238	85	72 520	4 130	6 084	11 853	17 623	23 392	
241	86	73 373	4 228	6 228	12 134	18 040	23 945	
244	87	74 226	4 327	6 374	12 418	18 462	24 505	
246	88	75 079	4 427	6 521	12 705	18 888	25 072	
249	89	75 932	4 528	6 670	12 995	19 320	25 645	
252	90	76 786	4 631	6 821	13 289	19 757	26 225	
255	91	77 639	4 734	6 973	13 586	20 198	26 811	
258	92	78 492	4 839	7 127	13 886	20 645	27 403	
260	93	79 345	4 945	7 283	14 189	21 096	28 002	
263	94	80 198	5 051	7 441	14 496	21 552	28 608	
266	95	81 051	5 160	7 600	14 806	22 013	29 219	
269	96	81 905	5 269	7 761	15 120	22 479	29 838	
272	97	82 758	5 379	7 923	15 436	22 949	30 463	
274	98	83 611	5 491	8 087	15 756	23 425	31 094	
277	99	84 464	5 603	8 253	16 079	23 906	31 732	
280	100	85 317	5 717	8 421	16 406	24 391	32 376	
283	101	86 170	5 832	8 590	16 736	24 881		
286	102	87 024	5 948	8 761	17 069	25 376		
288	103	87 877	6 065	8 934	17 405	25 876		
291	104	88 730	6 183	9 108	17 745	26 381		
294	105	89 583	6 303	9 284	18 087	26 891		
297	106	90 436	6 424	9 462	18 434	27 406		
300	107	91 290	6 545	9 641	18 783	27 925		
302	108	92 143	6 668	9 822	19 136	28 450		
305	109	92 996	6 792	10 005	19 492	28 979		
308	110	93 849	6 918	10 189	19 851	29 513		
311	111	94 702	7 044	10 375	20 214	30 052		
314	112	95 555	7 171	10 563	20 580	30 596		
316	113	96 409	7 300	10 752	20 949	31 145		
319	114	97 262	7 430	10 944	21 321	31 699		
322	115	98 115	7 561	11 136	21 697	32 257		
325	116	98 968	7 693	11 331	22 076	32 821		
327	117	99 821	7 826	11 527	22 458	33 389		
330	118	100 674	7 960	11 725	22 844	33 962		
333	119	101 528	8 096	11 925	23 232	34 540		
336	120	102 381	8 232	12 126	23 624	35 123		
339	121	103 234	8 370	12 329	24 020	35 711		
341	122	104 087	8 509	12 533	24 419	36 304		
344	123	104 940	8 649	12 740	24 820	36 901		
347	124	105 793	8 790	12 948	25 226	37 504		
350	125	106 647	8 933	13 157	25 634	38 111		
353	126	107 500	9 076	13 369	26 046	38 723		
355	127	108 353	9 221	13 582	26 461	39 340		
358	128	109 206	9 367	13 797	26 879	39 962		
361	129	110 059	9 514	14 013	27 301	40 589		
364	130	110 913	9 662	14 231	27 726	41 221		
367	131	111 766	9 811	14 451	28 154	41 857		
369	132	112 619	9 961	14 672	28 586	42 499		
372	133	113 472	10 113	14 895	29 020	43 145		
375	134	114 325	10 265	15 120	29 458	43 796		
378	135	115 178	10 419	15 347	29 900	44 453		
381	136	116 032	10 574	15 575	30 344	45 114		
383	137	116 885	10 730	15 805	30 792	45 779		

DIAMETER



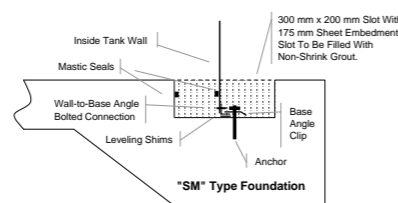
Notes to Capacity Charts:

- > Model Number => Diameter/Height. Example: Model "39/36" is 11.937m diameter and 11.231m high. If adding extension sheets, add corresponding letter to model number (i.e. "37/36A")
- > Height is from bottom of bottom angle to top of top angle - and assumes a 2"x2"x1/4" (50x50x6mm) bottom angle and a 3"x3"x1/4" (75x75x6mm) top angle.
- > No allowance is made for internal concrete floor or freeboard. Diameters are "construction expanded" diameters.
- > Intermediate capacities are available by using "extension" sheets and starter rings. See chart below for details. Add appropriate letter to model number as noted above.
- > Capacities are in cubic meters. Volume (in liters) per mm of height is shown for each diameter to facilitate the calculation for net capacity.
- > Charts are for general information only. Site specific design, wind, seismic, foundation and roof conditions, design codes and coatings will limit applicable sizes.

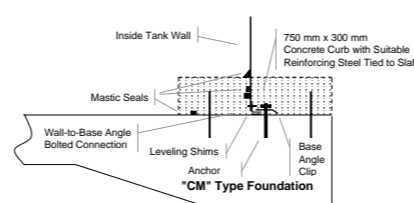
> Wall height adjustment guidelines:

- For standard SS and MS starter ring foundations, add 227 mm to wall height
- For standard SF foundation, add 433 mm to wall height
- For standard SM foundation, deduct 175 mm from wall height
- For Extension Ring "A" size, add 215 mm to wall height
- For Extension Ring "B" size, add 430 mm to wall height
- For Extension Ring "C" size, add 591 mm to wall height

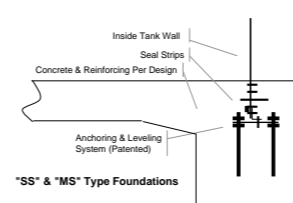
Typical Foundation Layout Details



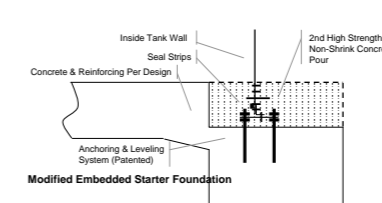
Slot Mount (SF)



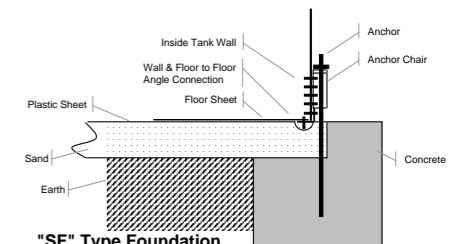
Curb Mount (CM)



Embedded Short/Mid Starter (SS/MS)



Modified Embedded Starter (MES)



Steel Floor (SF)