



# PERMASTORE<sup>®</sup> TANKS & SILOS

supplying the  
agricultural  
industry  
worldwide

PERMASTORE  
TANKS & SILOS



# The Company

Permastore's history of agricultural tank and silo supply goes back over 50 years with over 300,000 structures supplied across all market sectors. With a product range originating in grain and forage silos for high-quality animal feed storage, Permastore then led the development of high quality slurry tanks to help farms to comply with waste management legislation. This could be the European Commission (EC) Nitrates Directive for nitrate vulnerable zones (NVZ's) and in the USA the Natural Resources Conservation Service (NRCS) Environmental Quality Incentives Program (EQIP). In these cases the spreading and storage of waste is tightly regulated. Working through its global network of Distributors, Permastore is able to provide a cost-effective solution to help customers to meet these regulations.

PERMASTORE® Glass-Fused-to-Steel structures have been utilised extensively for the storage of agricultural livestock effluent. The experience we have gained over a period in excess of 40 years in association with independent assessment, continuous product development and improved quality provides a sound basis for a minimum 30 year Design Life compliant with ISO 15686 Part 1 (2011), Part 2 (2012) and Part 3 (2002) and provides a service life of up to 50 years.

The agricultural industry is increasingly diversifying to generate renewable energy by using anaerobic digestion (AD). Energy crops and organic waste produced on farms can be used to create biogas which is used either directly or to generate electricity. With government incentives such as feed-in tariffs becoming more wide spread around the world, it is possible for farmers / investors to have a relatively short pay-back time for biogas plant investment. With experience in manufacturing tanks for the anaerobic digestion industry dating back to the 1970's, PERMASTORE® tanks are ideally suited for the requirements of both digesters and storage tanks in this growth sector.

Available through a network of independent local Distributors who supply, install and commission the product, PERMASTORE® tanks offer an ideal solution for farm anaerobic digesters, post digesters and biogas storage. The modular nature of the PERMASTORE® design allows the flexibility to accommodate aspect ratios of choice, giving the benefits of simple logistics, ease of transport and fast build times to this growing sector in all parts of the world.

## Quality

The ECOFUSION® agricultural grade finish is subject to Permastore's stringent manufacturing, inspection and testing regimes in accordance with EN ISO and other International Standards.

For more aggressive farm digestion applications industrial grade finishes are available. All industrial grade finishes are subject to 100% inspection and electrical testing of the contact surface. Any panel having a discontinuity is rejected.

We have earned our market leading reputation by dedication to the highest quality and commitment to ZERO DISCONTINUITY (defect free at test voltage) glass fusion.

Full details of Permastore's Quality Standards are available to download from the website [www.permastore.com](http://www.permastore.com)



# Slurry

Farm pollution control has become important and effective and secure slurry storage is a critical part of the solution. Local environmental agencies around the world are using legislation and support schemes to encourage farmers to upgrade their slurry management systems to help protect the environment. This includes drivers such as the European Commission Nitrates Directive and the US Natural Resources Conservation Service EQIP programme.

The high level of security of the PERMASTORE® Glass-Fused-to-Steel tank system offers many benefits:

- Corrosion resistance of Glass-Fused-to-Steel reduces day-to-day operation and maintenance costs
- Modular bolted construction enables simple logistics to remote locations and facilitates rapid and cost-effective site installation
- Above ground storage provides security against flooding and minimises the risk of accidents
- Tanks can be fitted with a range of covers to provide effective odour control and weather protection
- The availability of taller tanks simplifies mixing for maximum nutrient benefits
- The modular design allows for future extension, modification or relocation



# Slurry Tank Capacity Chart for 3 and 4 Ring Tanks

(Smaller or larger structures exceeding 50,000m<sup>3</sup> are available on request)

Nominal Wall Height 4.27m (3 rings)				
Model	Diam (m)	Capacity		Free board gallons
		m <sup>3</sup>	gallons	
3415	10.25	348	76,643	5,442
3915	11.95	474	104,319	7,407
4515	13.66	619	136,254	9,675
5015	15.37	784	172,446	12,245
5615	17.08	968	212,897	15,117
6215	18.79	1,172	257,747	18,302
6715	20.49	1,394	306,571	21,768
7315	22.20	1,635	359,796	25,548
7815	23.91	1,897	417,278	29,629
8415	25.62	2,177	479,018	34,013
9015	27.33	2,479	545,279	38,718
9515	29.03	2,797	615,272	43,688
10115	30.74	3,135	689,786	48,979
10615	32.45	3,493	768,558	54,572
11215	34.15	3,871	851,587	60,468
11515	35.01	4,067	894,699	63,529
11815	35.86	4,268	938,875	66,666
12315	37.57	4,684	1,030,421	73,166
12915	39.28	5,119	1,126,224	79,969
13415	40.99	5,574	1,226,286	87,074
13715	41.84	5,809	1,277,913	90,739
14015	42.69	6,048	1,330,605	94,481
14615	44.40	6,542	1,439,183	102,190

Nominal Wall Height 5.67m (4 rings)				
Model	Diam (m)	Capacity		Free board gallons
		m <sup>3</sup>	gallons	
3420	10.25	464	102,039	5,442
3920	11.95	631	138,887	7,407
4520	13.66	825	181,403	9,675
5020	15.37	1,044	229,588	12,245
5620	17.08	1,288	283,443	15,117
6220	18.79	1,560	343,154	18,302
6720	20.49	1,855	408,157	21,768
7320	22.20	2,177	479,018	25,548
7820	23.91	2,525	555,547	29,629
8420	25.62	2,899	637,746	34,013
9020	27.33	3,300	725,963	38,718
9520	29.03	3,723	819,149	43,688
10120	30.74	4,174	918,354	48,979
10620	32.45	4,651	1,023,228	54,572
11220	34.15	5,154	1,133,770	60,468
11520	35.01	5,414	1,191,167	63,529
11820	35.86	5,682	1,249,982	66,666
12320	37.57	6,236	1,371,862	73,166
12920	39.28	6,816	1,499,411	79,969
13420	40.99	7,421	1,632,629	87,074
13720	41.84	7,733	1,701,364	90,739
14020	42.69	8,052	1,771,516	94,481
14620	44.40	8,709	1,916,072	102,190

- All PERMASTORE® Slurry Tanks comply with BS 5502 parts 22 (2003) & 50 (1993) and The Control of Pollution (Silage, Slurry and Agricultural Fuel Oil) (Scotland) Regulations 2003, The Control of Pollution (Silage, Slurry and Agricultural Fuel Oil) Regulations (Northern Ireland) 2003, The Water Resources (Control of Pollution) (Silage, Slurry and Agricultural Fuel Oil) (England) Regulations 2010 and The Water Resources (Control of Pollution) (Silage, Slurry and Agriculture Fuel Oil) (Wales) Regulations 2010.
- Complies with USDA NRCS Standard 313, Waste Storage Facility.
- Capacities listed are a guide. Seek local professional advice for capacity planning at a specific site.

**Typical capacity for cow slurry** = no. of cows x 12 gallons (54 Litres) x no. of days storage required.

**Typical capacity for washing etc.** = no. of cows x 4 gallons (18 Litres) x no. of days storage required.  
= gallons of slurry storage required.

**Typical capacity for pig slurry** = no. of pigs x 1.5-2.0 gallons (7-10 Litres) x no. of days storage required.  
= gallons of slurry storage required.

N.B. All measurements are nominal. Capacities are brimful and may reduce with concrete base slab and freeboard. Allowances should be made for the following when calculating sizes for slurry tanks:

1. Dirty Water from open yard areas (500 gallons per 1000 sq.ft area for every inch of water).
2. Rainfall on the tank itself.
3. Freeboard – BS 5502 regulations state that 300mm (1ft) must be left between the slurry level and the top of the tank.
4. Please note all gallons are UK gallons.

## Ancillaries

### Jetter

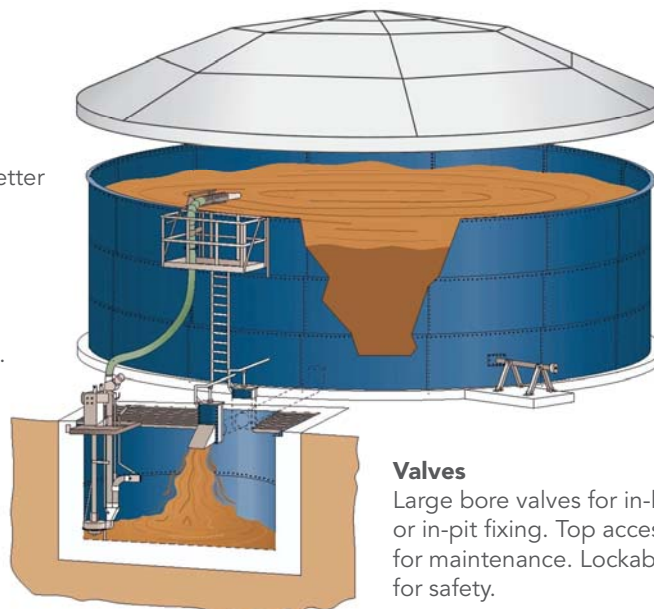
Easy to operate directional jetter to reduce slurry crusts.

### Platform and ladder

Handrails and trapdoor for safety. Removable ladder to prevent unauthorised access.

### Pump

For filling tank or loading field spreader. Adjustable for depth of pit. Directional jetter for mixing.



### Valves

Large bore valves for in-line or in-pit fixing. Top access for maintenance. Lockable for safety.

### PVC Dome Roof

Optional extra to provide odour control and weather protection.

## A Typical PERMASTORE® Slurry Storage System

### Mixer

Through-the-wall agitation for simple and efficient mixing.

### Base design

High specification for structural integrity.

# Farm Digestion

Farm digestion of waste, animal slurry and energy crops is seen as an important part of the global growth of renewable energy solutions. Anaerobic digestion (AD) is recognised as an ideal system to deal with waste slurries creating both a farm income stream and improving the slurry's properties as a fertilizer. In addition the digestion of energy crops is rapidly becoming a viable commercial diversification for farmers.

The PERMASTORE® solution to this growth sector offers the following benefits:

- Extensive history and experience of anaerobic digestion tanks dating back to the early 1970's
- Glass-Fused-to-Steel can be utilised in both the liquid zone and the gaseous zone reducing project costs and maximising the Service Life of the tank structure
- Corrosion resistance of Glass-Fused-to-Steel suitable for digesters and ancillary tanks gives long term security, reducing operation and maintenance costs
- Significant benefits of economy and security to farmers and biogas technology companies
- Glass-Fused-to-Steel tanks can also be used for biogas storage by incorporating double membrane roofs
- Modular bolted construction gives rapid and cost-effective site installation and the ability to remodel or relocate the structure gives asset value to the product
- Lifetime coating requiring minimal maintenance reduces downtime and therefore revenue losses
- Consistent factory controlled high quality product



**ISO FUSION® V700**

**TRI FUSION®**



# Silos

PERMASTORE® Glass-Fused-to-Steel silos provide clean and efficient storage of grains and forage. The secure sealed system with capacities from 250 to 1400 metric tonnes (300 to 1750m<sup>3</sup>), gives significant benefits to livestock producers:

- High quality feed grain
- Maximised nutrient value of the feed with lower moisture loss
- Natural conservation without use of chemicals
- No drying costs
- Exclusion of vermin and birds
- Natural suppression of diseases and weeds by the dark, oxygen limiting environment
- Suitability for organically grown produce
- Traceability of inputs for accreditation schemes
- Permits earlier harvesting to eliminate drying costs

- Harvesting flexibility and buffer storage for existing grain storage systems
- Greater palatability for livestock
- High digestibility for livestock
- High animal growth rates and feed conversion efficiency



# Technical Specification for Silos

## Silo Sizes and Volumes

Model Reference – Height				20	25	30	35	40	45	50	55	60	65	70	80	90
Cylinder Height (m)				5.65	7.05	8.45	9.84	11.24	12.64	14.04	15.43	16.83	18.23	19.62	22.48	25.28
No. of Rings				4	5	6	7	8	9	10	11	12	13	14	16	18
Model Reference – Diameter	Actual Diameter (m)	Cross Section Area (m <sup>2</sup> )	No. of Sheets per Ring	Volume (m <sup>3</sup> )												
14	4.27	14.3	5	80	100	120	140	160	180	200	220					
17	5.12	20.60	6	115	144	173	201	230	259	288	316	345	374			
20	5.98	28.05	7	157	196	235	274	313	353	392	431	470	509	549	627	
25	7.69	46.36	9	259	324	389	453	518	583	648	712	777	842	907	1040	1160
31	9.39	69.25	11	387	484	580	677	774	871	967	1060	1160	1260	1350	1550	1740

## Cone Capacities (from base of cylinder to bottom of cone)

Model Reference – Diameter		14	17	20	25
		Volume (m <sup>3</sup> )			
Angle Reference	45°	10	17	27	59
	60°	18	31	48	102

Cone volume will vary with size at bottom opening.

Silo capacity is derived by adding cubic volume of cylinder to cubic volume of cone. Applying a bulk density factor to the cubic capacity will give the weight of products stored. Reduction should then be made to the natural angle of repose of material. Depending on roof design, some storage capacity may be obtained from roof area.

Actual capacities of specific silo application may vary due to structural design features of individual installations.





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