

# PowerSafe®

*Sustainable solutions*

## PowerSafe® TS



The PowerSafe® TS range offers a high-performance, long-life solution for renewable energy applications.

PowerSafe® TS cells are based on conventional, vented technology and designed for renewable energy applications that require maximum cycle life with the highest level of reliability. They are particularly suitable for use in solar energy installations, ensuring a continuity of electrical supply during the hours of darkness or during periods of reduced sunshine.

Reduced maintenance is achieved through the use of additional electrolyte which means cells only have to be topped-up once a year. This helps to keep down maintenance costs and makes them an ideal solution for many remote or unmanned locations.

Tubular positive plates are widely used in batteries for particularly demanding applications. In the TS range they have been optimised to give an extended cycle life and increased capacity.

### Key Benefits

- Capacities from 300Ah to 4580Ah at the 120 hour rate (C120)
- Products available in filled or dry charged versions
- Up to 5200 cycles to 25% depth of discharge
- Topping up required once a year only
- Minimal maintenance required
- Excellent operational safety including: fully insulated connectors and terminals, acidproof flame arrestor plug for each cell, protection of polarities during transport

**EnerSys**  
Power/Full Solutions

General Specifications			Nominal Capacity (Ah)		Nominal Dimensions						Typical Weight Dry charged		Typical Weight Acid Filled		Electrolyte Volume		Short Circuit Current	Internal Resistance
Type	Nominal Voltage (V)	Number of Terminals	10 hr rate to 1.80Vpc @20°C	120 hr rate to 1.85Vpc @25°C	Length		Width		Height		kg	lbs	kg	lbs	Litres	US Gal	(A)	(mΩ)
TLS 4	2	2	220	300	103	4.06	206	8.12	389	15.33	13.0	28.6	18.0	39.8	3.9	1.0	2059	1.02
TLS 5	2	2	270	367	124	4.89	206	8.12	389	15.33	15.5	34.2	21.9	48.2	4.9	1.3	2625	0.8
TLS 6	2	2	323	440	145	5.71	206	8.12	389	15.33	18.1	39.8	25.6	56.5	5.8	1.5	3000	0.7
TVS 4	2	2	340	460	124	4.89	206	8.12	505	19.9	18.4	40.6	27.3	60.3	6.9	1.8	2838	0.74
TVS 5	2	2	390	530	124	4.89	206	8.12	505	19.9	21.5	47.3	30.0	66.2	6.6	1.7	3281	0.64
TVS 6	2	2	470	640	145	5.71	206	8.12	505	19.9	25.1	55.3	35.4	78.0	7.9	2.1	3750	0.56
TVS 7	2	2	550	745	166	6.54	206	8.12	505	19.9	28.7	63.2	40.7	89.7	9.2	2.4	4200	0.5
TYS 5	2	2	590	802	145	5.71	206	8.12	684	26.95	29.8	65.8	44.6	98.3	11.3	3.0	3621	0.58
TYS 6	2	2	670	912	145	5.71	206	8.12	684	26.95	34.0	75.0	48.4	106.7	11.0	2.9	4200	0.5
TYS 7	2	2	816	1120	191	7.53	210	8.27	684	26.95	40.5	89.2	59.6	131.3	14.8	3.9	5147	0.41
TYS 8	2	2	900	1220	191	7.53	210	8.27	684	26.95	44.6	98.4	63.2	139.4	14.5	3.8	5676	0.37
TYS 9	2	2	1040	1415	233	9.18	210	8.27	684	26.95	50.2	110.8	73.9	163.0	18.3	4.8	6625	0.32
TYS 10	2	2	1120	1523	233	9.18	210	8.27	684	26.95	54.4	119.9	77.8	171.6	18.0	4.8	7000	0.3
TYS 11	2	2	1260	1714	275	10.84	210	8.27	684	26.95	60.0	132.2	88.4	194.8	21.9	5.8	8108	0.26
TYS 12	2	2	1340	1825	275	10.84	210	8.27	684	26.95	64.1	141.4	92.3	203.5	21.6	5.7	8824	0.24
TZS 11	2	4	1560	2130	275	10.84	210	8.27	829	32.66	76.5	168.6	112.3	247.6	27.5	7.3	7554	0.28
TZS 12	2	4	1710	2335	275	10.84	210	8.27	829	32.66	81.7	180.0	117.0	257.9	27.1	7.2	8400	0.25
TZS 13	2	6	1940	2640	399	15.72	214	8.43	813	32.03	94.9	209.2	146.6	323.2	39.7	10.5	8936	0.24
TZS 14	2	6	2040	2775	399	15.72	214	8.43	813	32.03	101.8	224.5	153.4	338.2	39.6	10.5	9589	0.22
TZS 15	2	6	2150	2925	399	15.72	214	8.43	813	32.03	105.4	232.4	156.0	343.9	38.9	10.3	10294	0.2
TZS 16	2	6	2240	3050	399	15.72	214	8.43	813	32.03	110.3	243.2	160.9	354.7	38.9	10.3	11053	0.19
TZS 17	2	8	2430	3310	487	19.19	212	8.35	813	32.03	122.0	269.0	182.2	401.6	48.5	12.8	11667	0.18
TZS 18	2	8	2555	3480	487	19.19	212	8.35	813	32.03	127.6	281.3	186.7	411.7	47.8	12.6	12353	0.17
TZS 20	2	8	2800	3810	487	19.19	212	8.35	813	32.03	137.8	303.8	199.8	440.5	47.6	12.6	14000	0.15
TZS 22	2	8	3090	4210	576	22.69	212	8.35	813	32.03	151.9	335.0	223.5	492.7	57.7	15.2	11053	0.19
TZS 24	2	8	3360	4580	576	22.69	212	8.35	813	32.03	162.6	358.4	235.8	519.9	56.3	14.9	16154	0.13

Notes: The electrical values shown in the table relate to performance from a fully charged condition at ambient temperature of +25°C. Height shown is overall height, including connectors and shrouds.

## Installation and Operation

- Recommended temperature range: 10°C/+50°F to +40°C/+86°F (preferred value 25°C/68°F)
- Can be installed on steel or wooden racks.

## Standards

- Compliant with international standard IEC 60896-11
- Compliant with international standard IEC 61427:2005.
- Manufactured in EnerSys® ISO 9001 certified production facilities.

### Construction

**Positive electrode:** die cast tubular plate with optimum lead antimony.

**Negative electrode:** pasted flat plate with lead antimony alloy grid.

**Separators:** low resistance microporous material.

**Container:** moulded from durable, transparent styrene acrylonitrile (SAN) to allow electrolyte level and cell condition to be monitored visually.

**Lid:** made from Acrylonitrile Butadiene Styrene (ABS).

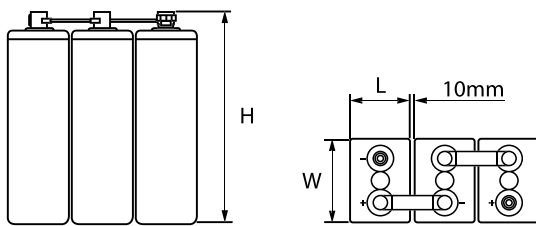
**Vent plugs:** safety plugs equipped with flame arrestors. Special vent plugs allowing topping-up and S.G. reading without the need to remove them, are available on request.

**Electrolyte:** diluted sulphuric acid with a specific gravity of  $1.240 \pm 0.010$  (maximum level) at 25°C for a fully charged cell. Large reserve of electrolyte reduces topping-up to once a year.

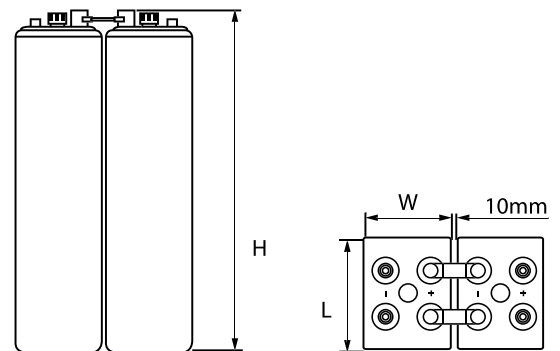
**Terminals:** lead alloy leakproof pole with brass insert designed to give minimum resistance and maximum current flow.

**Connectors:** fully insulated, solid copper inter-cell connectors allow voltage measurements.

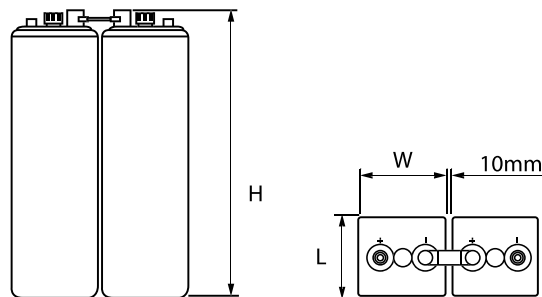
TLS, TVS, TYS 5 - TYS 6



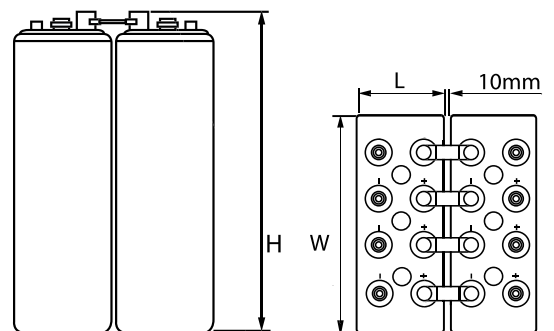
TZS 11, TZS 12



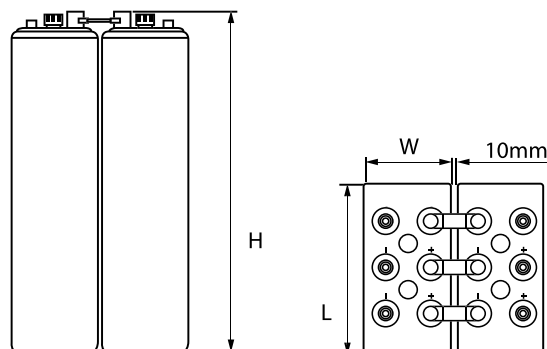
TYS 7 - TYS 12



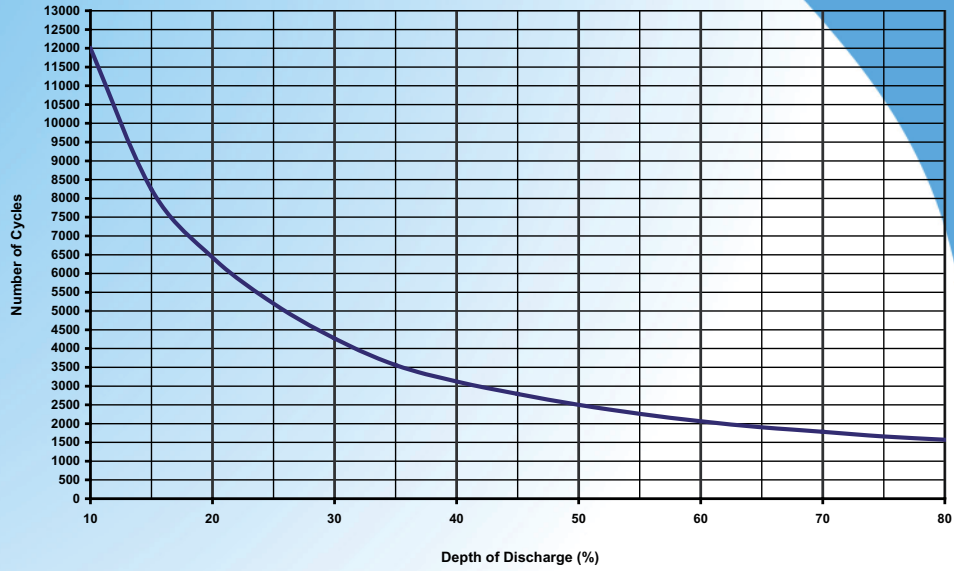
TZS 17 - TZS 24



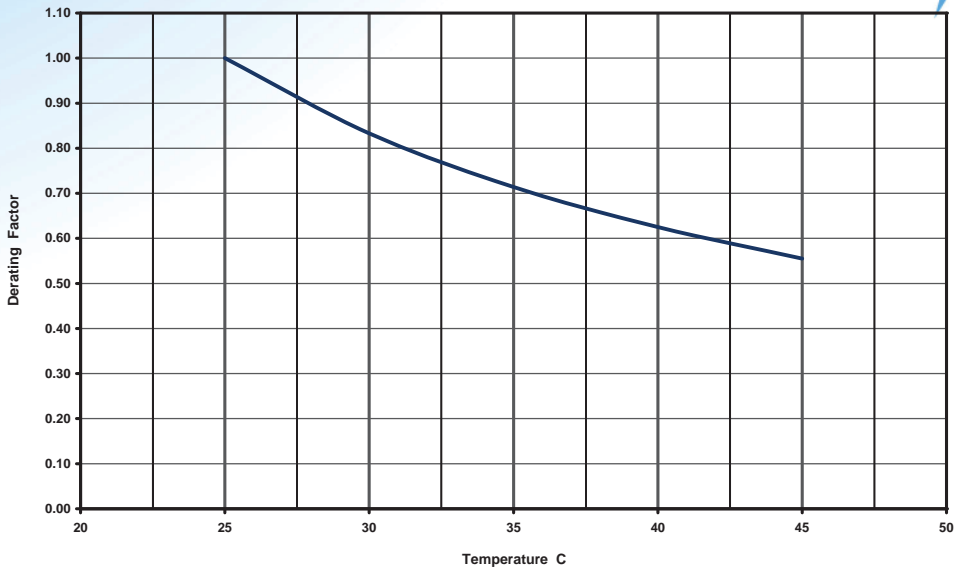
TZS 13 - TZS 16



PowerSafe® TS Renewable Energy Applications  
Number of Cycles vs Depth of Discharge (25°C)



Batteries for renewable energy applications  
Derating factor for number of cycles vs average cell temperature



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