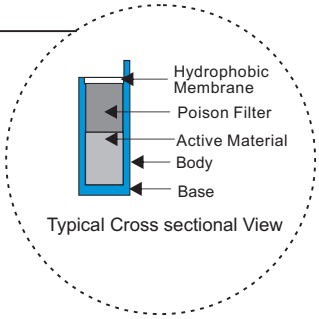
CELLYTE TSG Range

Solar Battery for up to 30°C Operation
Sealed VRLA Solar Monobloc
Introducing New Monobloc Catalyst Technology
Designed for Full Life at 30°C Operation
Capacities: 50Ah. to 250Ah. @ C/100



New Monobloc Catalyst

SPECIFICATIONS

Voltage .....12 Volt nominal
Plates Extra Heavy Duty
Plate alloy .....Virgin Pure Lead /1.6% Tin
Terminal ..... Copper insert for SS bolts
Container /cover ...ABS
Charge voltage .... Cycle 2.35 Vpc;
Float 2.25 to 2.30 Vpc @ 20 C
Specific gravity ... 1.280
Electrolyte .....Sulphuric acid thixotropic gel
Vent .....Self sealing - 2psi operation
Operating temperature : -25 to +55 (However we recommend that the batteries be operated in the temperature range of 20 to 30 C, to obtain full life and optimum performance.)

DEEP CYCLE APPLICATIONS

* Alternative Energy Storage
* Solar Photovoltaic/Wind
* Cycling/Float Service
* Wheelchair/Electric vehicle
* Boats/Marine/Navigational Aids
* Floor Cleaning machines
* Engine Starting
* Water Pumping/Golf caddy
* Portable medical equipment
* Cathodic Protection

EXTRA FEATURES (with optional Catalyst)

* Will reduce float current by about 50%
* Will reduce gassing by up to 80%
* Will minimise water loss
* Reduce cell failure due to dry out
* Will extend battery float service life due to reduced plate corrosion
* Batteries will have full design life when used in temperatures up to 30 C.
* Will maintain full battery capacity by preventing depolarization of negative plate
* Reduces the possibility of thermal runaway

INNOVATIVE FEATURES

* Valve Regulated Lead Acid
* Fully tank formed plates
* Gelled Thixotropic electrolyte
* Spill-proof / leak proof
* Multi-position usage
* Multi-cell container
* Low self-discharge
* Quality system - ISO 9001
* FAA and IATA Approved as NON Hazardous

LEAD RETURN Pb RECYCLE

Supplied Worldwide by:
SEC Industrial Battery Co.
Visit our website at www.secbattery.com

CELLYTE Solar TSG Bloc Batteries

In keeping with our philosophy to stay at the forefront of the ever expanding Renewable Energy battery market we have extended our range of gelled electrolyte batteries to include Monobloc battery fitted with a Catalyst increasing the operating temperature at which the battery can be operated up to 30 C without loss of battery life, this is a - World First.
Also included are several innovative features: triple barrier terminal post seal, high Tin / Calcium positive plate alloy for improved, by up to 40%, deep cycle capability of the Solar TSG batteries.

Sealed Valve Regulated Construction

*These batteries are of the gelled electrolyte technology (Gel). All the electrolyte in the cells is immobilized in a Thixotropic Gel providing a safe non-spillable battery.

Gas Recombination System

*The gasses generated in the normal charge / discharge use of a rechargeable lead acid battery are internally recombined during normal operating parameters and in normal operational use, more than 99% of the gas generated is recombined.

SEC Catvent - Catalyst Vent

*SEC's VRLA cells /batteries incorporate the Philadelphia Scientific Monobloc precious metal Catalyst Catvent which prevents the negative plate from depolarizing reduces the cell float current by up to 50%, reduces the cell gassing by about 80%,thus reducing the cell dry out rate which is the major cause of VRLA battery failure

Battery Maintenance

*The battery has been designed and built such that no addition of electrolyte or water is needed during the life of the battery.

Battery Life in Float Service

***CELLYTE** Solar TSG batteries a suitable for float / standby service with a design life of about 10 years at 20C.

Batteries Engineered in the USA

Battery Life in Cycle Life

***CELLYTE** Solar TSG batteries are suitable for deep cycle service, battery life will depend on temperature, depth and frequency of cycling, however the use of the Catvent Catalyst will improve life.

Battery One-Way Safety Valve

*When pressure builds up in the cell the B & S German safety one-way valve opens at 2-3 psi and releases the excessive pressure and then closes. The one-way valve does not allow the ingress of oxygen which is harmful and reduces battery life.

Temperature Range for Normal Operation

***CELLYTE** Solar TSG batteries have a wide operating temperature range -25 C. to +55 C. However for maximum life it is recommended to operate the battery at 15 C. to 30 C.

Plate Design and Paste Formulation

*SEC has optimised the plate and paste formulation to maximise the operating life of the battery. The High Tin (1.6%) / Calcium plate alloy is used to minimise positive plate corrosion, extend battery life and cycling capability. SEC's special paste formulation will provide excellent recovery from deep discharge, with low self discharge to ensure maximum storage time.

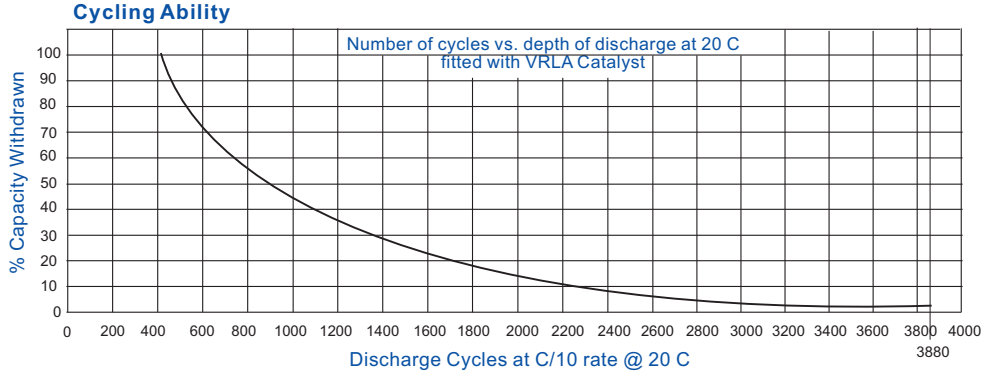
CELLYTE Bloc 12TSG Ampere Hour Data @ 20 C.

SEC Bloc Gel TYPE	END Volts / CELL	DISCHARGE DATA TIME IN MINUTES			END Volts / CELL	DISCHARGE DATA AMPERE HOURS @ 20 C DISCHARGE TIME IN HOURS														
		15	30	45		1	1.5	2	3	4	5	6	8	10	12	20	24	48	72	100
12TSG 50	1.80	53.1	34.0	25.4	1.85	21.0	21.5	24.2	26.2	27.5	28.5	29.5	31.8	32.8	33.4	36.4	37.6	39.3	40.7	42.1
	1.75	57.6	35.2	26.2	1.80	21.5	22.8	25.6	27.8	29.2	30.2	31.3	33.7	35.1	35.7	38.9	39.4	40.7	42.1	43.4
	1.67	60.5	36.0	26.3	1.75	21.7	23.4	26.3	28.4	29.9	31.0	32.0	34.6	36.0	36.7	40.0	40.6	41.8	43.0	44.3
12TSG 60	1.80	73.0	46.8	34.9	1.85	28.9	29.6	33.2	36.0	37.8	39.2	40.5	43.7	45.0	45.9	50.1	51.6	54.0	55.9	57.8
	1.75	79.2	48.4	36.0	1.80	29.6	31.4	35.3	38.2	40.1	41.5	43.0	46.3	48.2	49.1	53.5	54.2	56.0	57.8	59.7
	1.67	83.2	49.5	36.1	1.75	29.8	32.2	36.1	39.1	41.1	42.6	44.1	47.5	49.5	50.5	55.0	55.8	57.4	59.2	60.9
12TSG 80	1.80	92.9	59.5	44.4	1.85	36.7	37.7	42.3	45.8	48.1	49.8	51.6	55.6	57.3	58.5	63.7	65.7	68.7	71.2	73.6
	1.75	101	61.6	45.8	1.80	37.6	40.0	44.9	48.6	51.0	52.9	54.7	59.0	61.4	62.5	68.0	69.0	71.3	73.6	75.9
	1.67	106	63.0	46.0	1.75	37.9	41.0	46.0	49.8	52.3	54.2	56.1	60.5	63.0	64.3	70.0	71.1	73.1	75.3	77.5
12TSG 90	1.80	104	66.3	49.5	1.85	40.9	42.0	47.1	51.0	53.6	55.5	57.5	62.0	63.9	65.2	71.0	73.2	76.5	79.3	82.0
	1.75	112	68.6	51.1	1.80	41.9	44.5	50.0	54.1	56.9	58.9	61.0	65.7	68.4	69.7	75.8	76.9	79.4	82.0	84.6
	1.67	118	70.1	51.3	1.75	42.2	45.6	51.2	55.5	58.3	60.4	62.5	67.4	70.2	71.6	78.0	79.2	81.4	83.9	86.3
12TSG 100	1.80	119	76.5	57.1	1.85	47.2	48.4	54.4	58.9	61.9	64.1	66.3	71.5	73.7	75.2	81.9	84.5	88.3	91.5	94.6
	1.75	130	79.2	58.9	1.80	48.4	51.4	57.7	62.5	65.6	68.0	70.4	75.8	78.9	80.4	87.5	88.7	91.6	94.6	97.6
	1.67	136	80.9	59.1	1.75	48.7	52.7	59.1	64.0	67.2	69.7	72.1	77.8	81.0	82.6	90.0	91.4	94.0	96.8	99.6
12TSG 110	1.80	133	85.0	63.5	1.85	52.5	53.8	60.4	65.4	68.7	71.2	73.7	79.5	81.9	83.5	91.0	93.9	98.1	102	105
	1.75	144	88.0	65.5	1.80	53.8	57.1	64.1	69.4	72.9	75.5	78.2	84.2	87.7	89.3	97.2	98.6	102	105	108
	1.67	151	89.9	65.7	1.75	54.1	58.5	65.7	71.1	74.7	77.4	80.1	86.4	90.0	91.8	100	102	104	108	111
12TSG 120	1.80	146	93.5	69.8	1.85	57.7	59.2	66.5	72.0	75.6	78.3	81.1	87.4	90.1	91.9	100	103	108	112	116
	1.75	158	96.8	72.0	1.80	59.2	62.8	70.5	76.3	80.2	83.1	86.0	92.7	96.4	98.3	107	108	112	116	119
	1.67	166	98.9	72.3	1.75	59.6	64.4	72.3	78.2	82.2	85.1	88.1	95.0	99.0	101	110	112	115	118	122
12TSG 130	1.80	159	102	76.2	1.85	63.0	64.6	72.5	78.5	82.5	85.4	88.4	95.4	98.3	109	109	113	118	122	126
	1.75	173	106	78.5	1.80	64.5	68.5	76.9	83.3	87.5	90.7	93.8	101	105	117	117	118	122	126	130
	1.67	182	108	78.9	1.75	65.0	70.2	78.8	85.3	89.6	92.9	96.1	104	108	120	120	122	125	129	133
12TSG 150	1.80	181	116	86.3	1.85	71.4	73.2	82.2	89.0	93.5	96.8	100	108	111	114	124	128	133	138	143
	1.75	196	120	89.0	1.80	73.1	77.7	87.2	94.4	99.2	103	106	115	119	121	132	134	138	143	148
	1.67	206	122	89.4	1.75	73.6	79.6	89.4	96.7	102	105	109	118	122	125	136	138	142	146	151
12TSG 170	1.80	218	139	104	1.85	86.1	88.3	99.1	107	113	117	121	130	134	137	149	154	161	167	172
	1.75	236	144	107	1.80	88.2	93.6	105	114	120	124	128	138	144	146	159	162	167	173	179
	1.67	248	147	108	1.75	88.8	95.9	108	117	123	127	131	142	148	151	164	166	171	176	182
12TSG 210*	1.80	252	162	121	1.85	99.7	102	115	124	131	135	140	151	156	159	173	178	186	193	200
	1.75	274	167	124	1.80	102	108	122	132	139	144	149	160	167	170	185	187	193	200	206
	1.67	288	171	125	1.75	103	111	125	135	142	147	152	164	171	174	190	193	198	205	211
12TSG 250	1.80	312	200	149	1.85	123	126	142	154	162	167	173	187	192	196	214	221	231	239	247
	1.75	338	207	154	1.80	126	134	151	163	171	178	184	198	206	210	228	232	239	247	255
	1.67	356	211	154	1.75	127	137	154	167	176	182	188	203	212	216	235	239	245	253	260

Actual Battery Discharge Data may be +/-5% of figures shown.

* Gel sizes not available until mid 2006

Cycling Ability



BATTERY CYCLING - CYCLING ABILITY

The SEC ***CELLYTE*** 6-12TSG Range of batteries with Virgin pure lead / 1.6% Tin Grid, fitted with VRLA Catalyst, is designed for excellent cycling ability.. ***CELLYTE*** 6-12TSG batteries are capable of 3800 + charge / discharge cycles depending on the depth of discharge.

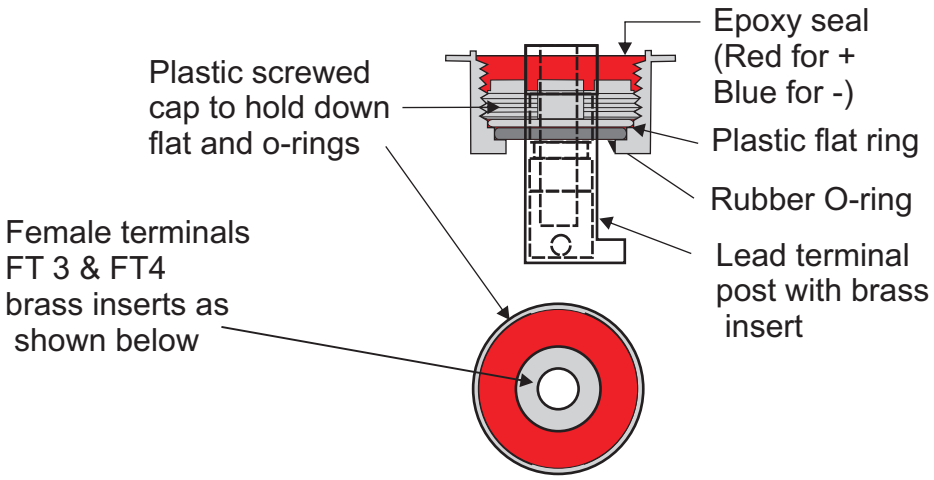
TYPICAL CYCLIC PERFORMANCE

CAPACITY WITHDRAWN	CYCLES
100%	410
80%	550
50%	880
40%	1060
30%	1335
20%	1680
10%	2200
5%	2730
0-2%	3880

The Worlds First - Monobloc Catalyst Battery

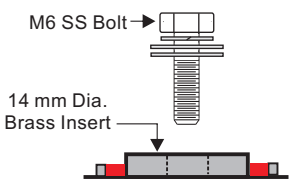
SEC CELLYTE Solar TSG Monobloc batteries are the first to use a **CatVent Catalyst** in the cell head space. This is done for several very good reasons. The Catalyst changes the electrochemical actions within the cell, this causes balance within the cell preventing the negative plate from depolarising over time and improves cell capacity. A healthy balance in the cell will be immediately obvious by a reduction of the cell's float current by up to 50%. What that means is a dramatic reduction, by up to 80% in cell gassing, reduced loss which delays cell dry out*, reduced positive plate corrosion, reduced cell heating, reducing the risk of thermal run away and a reduction in the energy required to cool the cells / batteries.

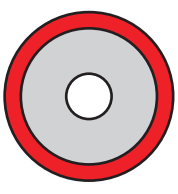
*** Please note:** Battery dry out is one of the major failure modes of VRLA batteries.



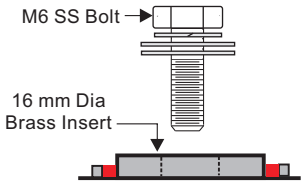
TYPICAL TRIPLE SEAL DETAIL

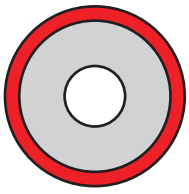
TYPICAL FEMALE TERMINAL DETAIL



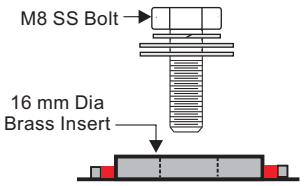


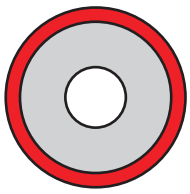
14 mm Brass Insert
Terminal for M6 Bolt
TYPE FT 3





16 mm Brass Insert
Terminal for M6 Bolt
TYPE FT 4



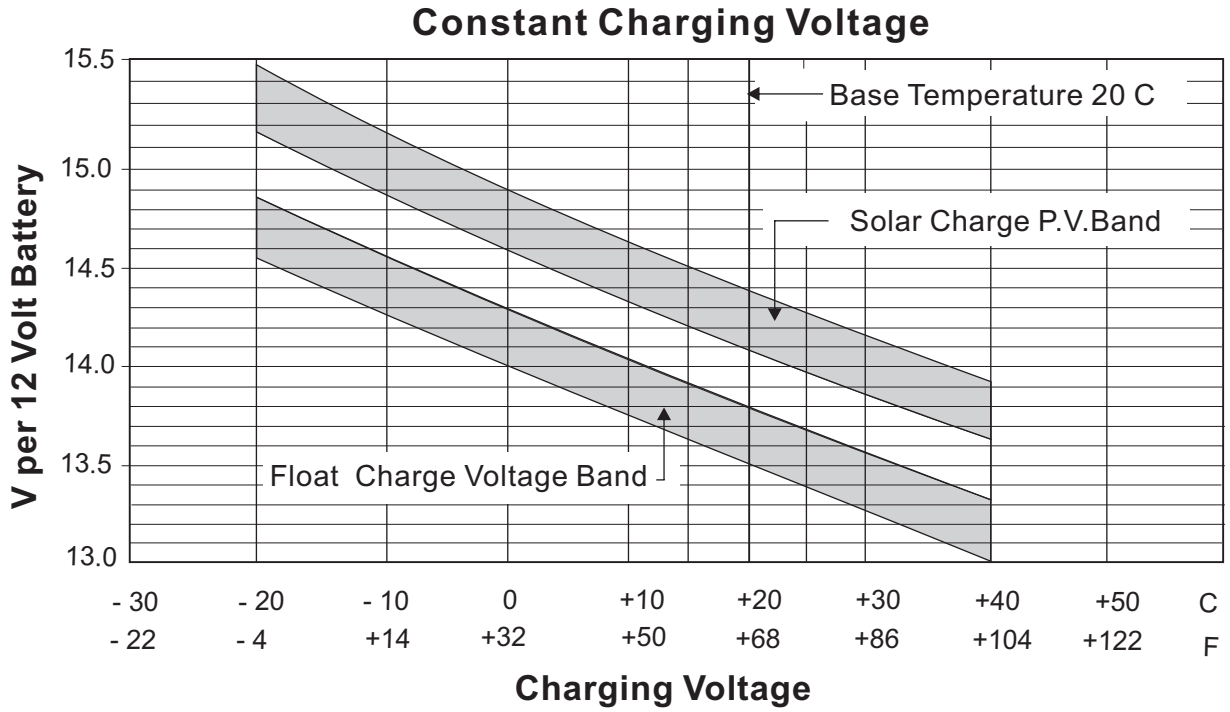


16 mm Brass Insert
Terminal for M8 Bolt
TYPE FT 5

CELLYTE Bloc 12TSG Amps Data @ 20 C.

SEC Bloc Gel TYPE	END Volts / CELL	DISCHARGE DATA TIME IN MINUTES 15	30	45	END Volts / CELL	DISCHARGE DATA AMPS @ 20 C DISCHARGE TIME IN HOURS 1	1.5	2	3	4	5	6	8	10	12	20	24	48	72	100
12TSG 50	1.80	53.1	34.0	25.4	1.85	21.0	14.4	12.1	8.72	6.87	5.70	4.91	3.97	3.28	2.78	1.82	1.56	0.82	0.56	0.42
	1.75	57.6	35.2	26.2	1.80	21.5	15.2	12.8	9.25	7.29	6.04	5.21	4.21	3.51	2.98	1.94	1.64	0.85	0.58	0.43
	1.67	60.5	36.0	26.3	1.75	21.7	15.6	13.1	9.48	7.47	6.19	5.34	4.32	3.60	3.06	2.00	1.69	0.87	0.60	0.44
12TSG 60	1.80	73.0	46.8	34.9	1.85	28.9	19.7	16.6	12.0	9.45	7.83	6.76	5.46	4.50	3.83	2.50	2.15	1.12	0.78	0.58
	1.75	79.2	48.4	36.0	1.80	29.6	20.9	17.6	12.7	10.0	8.31	7.17	5.79	4.82	4.09	2.67	2.26	1.17	0.80	0.60
	1.67	83.2	49.5	36.1	1.75	29.8	21.5	18.1	13.0	10.3	8.51	7.34	5.94	4.95	4.21	2.75	2.33	1.20	0.82	0.61
12TSG 80	1.80	92.9	59.5	44.4	1.85	36.7	25.1	21.2	15.3	12.0	10.0	8.60	6.96	5.73	4.87	3.19	2.74	1.43	0.99	0.74
	1.75	101	61.6	45.8	1.80	37.6	26.6	22.4	16.2	12.8	10.6	9.12	7.37	6.14	5.21	3.40	2.87	1.48	1.02	0.76
	1.67	106	63.0	46.0	1.75	37.9	27.3	23.0	16.6	13.1	10.8	9.35	7.56	6.30	5.36	3.50	2.96	1.52	1.05	0.77
12TSG 90	1.80	104	66.3	49.5	1.85	40.9	28.0	23.6	17.0	13.4	11.1	9.58	7.75	6.39	5.43	3.55	3.05	1.59	1.10	0.82
	1.75	112	68.6	51.1	1.80	41.9	29.7	25.0	18.0	14.2	11.8	10.2	8.21	6.84	5.81	3.79	3.20	1.65	1.14	0.85
	1.67	118	70.1	51.3	1.75	42.2	30.4	25.6	18.5	14.6	12.1	10.4	8.42	7.02	5.97	3.90	3.30	1.70	1.17	0.86
12TSG 100	1.80	119	76.5	57.1	1.85	47.2	32.3	27.2	19.6	15.5	12.8	11.1	8.94	7.37	6.27	4.10	3.52	1.84	1.27	0.95
	1.75	130	79.2	58.9	1.80	48.4	34.3	28.9	20.8	16.4	13.6	11.7	9.48	7.89	6.70	4.37	3.70	1.91	1.31	0.98
	1.67	136	80.9	59.1	1.75	48.7	35.1	29.6	21.3	16.8	13.9	12.0	9.72	8.10	6.89	4.50	3.81	1.96	1.34	1.00
12TSG 110	1.80	133	85.0	63.5	1.85	52.5	35.9	30.2	21.8	17.2	14.2	12.3	9.94	8.19	6.96	4.55	3.91	2.04	1.41	1.05
	1.75	144	88.0	65.5	1.80	53.8	38.1	32.1	23.1	18.2	15.1	13.0	10.5	8.77	7.44	4.86	4.11	2.12	1.46	1.08
	1.67	151	89.9	65.7	1.75	54.1	39.0	32.9	23.7	18.7	15.5	13.4	10.8	9.00	7.65	5.00	4.23	2.18	1.49	1.11
12TSG 120	1.80	146	93.5	69.8	1.85	57.7	39.5	33.2	24.0	18.9	15.7	13.5	10.9	9.01	7.66	5.01	4.30	2.25	1.55	1.16
	1.75	158	97	72.0	1.80	59.2	41.9	35.3	25.4	20.0	16.6	14.3	11.6	9.64	8.19	5.35	4.52	2.33	1.61	1.19
	1.67	166	99	72.3	1.75	59.6	42.9	36.1	26.1	20.5	17.0	14.7	11.9	9.90	8.42	5.50	4.65	2.39	1.64	1.22
12TSG 130	1.80	159	102	76.2	1.85	63.0	43.1	36.3	26.2	20.6	17.1	14.7	11.9	9.83	9.10	5.46	4.69	2.45	1.69	1.26
	1.75	173	106	78.5	1.80	64.5	45.7	38.5	27.8	21.9	18.1	15.6	12.6	10.5	9.73	5.83	4.93	2.54	1.75	1.30
	1.67	182	108	78.9	1.75	65.0	46.8	39.4	28.4	22.4	18.6	16.0	13.0	10.8	10.0	6.00	5.08	2.61	1.79	1.33
12TSG 150	1.80	181	116	86.3	1.85	71.4	48.8	41.1	29.7	23.4	19.4	16.7	13.5	11.1	9.47	6.19	5.32	2.78	1.92	1.43
	1.75	196	120	89	1.80	73.1	51.8	43.6	31.5	24.8	20.5	17.7	14.3	11.9	10.1	6.61	5.58	2.88	1.99	1.48
	1.67	206	122	89	1.75	73.6	53.0	44.7	32.2	25.4	21.1	18.2	14.7	12.2	10.4	6.80	5.75	2.96	2.03	1.51
12TSG 170	1.80	218	139	104	1.85	86.1	58.8	49.6	35.8	28.2	23.4	20.1	16.3	13.4	11.4	7.46	6.42	3.35	2.32	1.72
	1.75	236	144	107	1.80	88.2	62.4	52.6	37.9	29.9	24.8	21.4	17.3	14.4	12.2	7.97	6.73	3.48	2.40	1.79
	1.67	248	147	108	1.75	88.8	64.0	53.9	38.9	30.6	25.4	21.9	17.7	14.8	12.5	8.20	6.94	3.57	2.45	1.82
12TSG 210*	1.80	252	162	121	1.85	99.7	68.2	57.4	41.4	32.6	27.1	23.3	18.9	15.6	13.2	8.65	7.43	3.88	2.68	2.00
	1.75	274	167	124	1.80	102	72.3	60.9	43.9	34.6	28.7	24.8	20.0	16.7	14.1	9.23	7.80	4.03	2.78	2.06
	1.67	288	171	125	1.75	103	74.1	62.4	45.0	35.5	29.4	25.4	20.5	17.1	14.5	9.50	8.04	4.13	2.84	2.11
12TSG 250	1.80	312	200	149	1.85	123	84.3	71.0	51.2	40.4	33.5	28.9	23.3	19.2	16.4	10.7	9.19	4.80	3.32	2.47
	1.75	338	207	154	1.80	126	89.5	75.3	54.4	42.8	35.5	30.6	24.7	20.6	17.5	11.4	9.65	4.98	3.43	2.55
	1.67	356	211	154	1.75	127	91.7	77.2	55.7	43.9	36.4	31.4	25.4	21.2	18.0	11.8	9.94	5.11	3.51	2.60

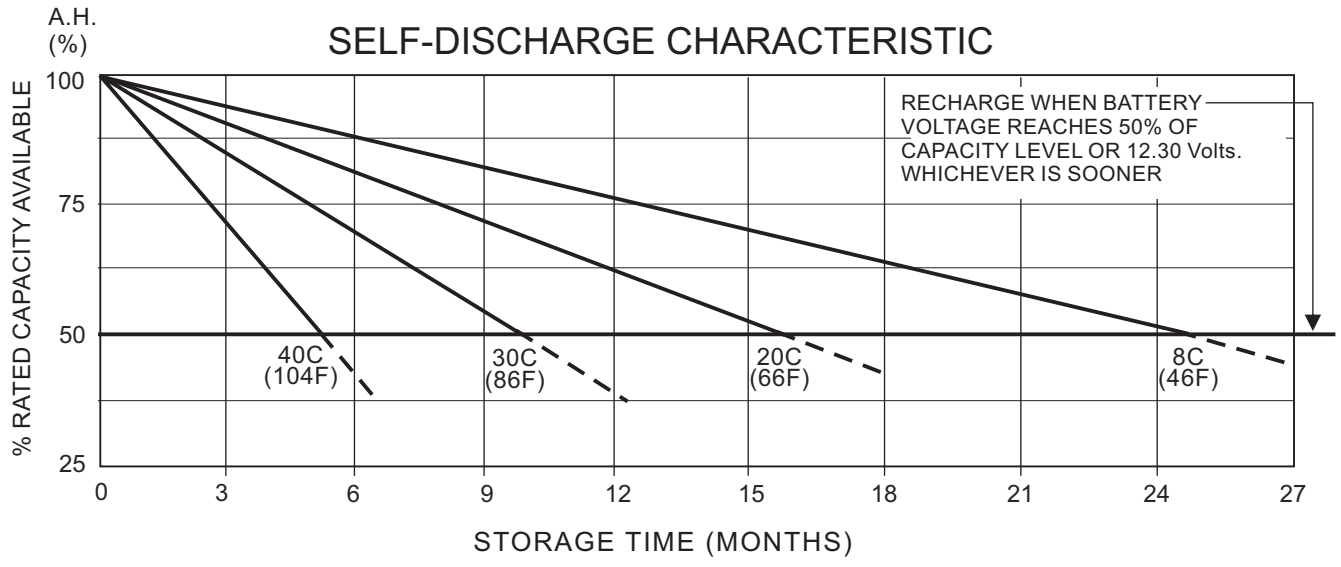
Actual Battery Discharge Data may be +/-5% of figures shown. * Gel sizes not available until mid 2006



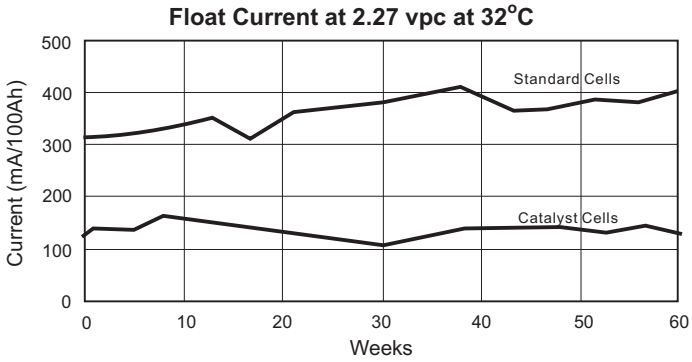
CELLYTE 12TSG Watts per Cell @ 20 C.

SEC Bloc Gel TYPE	END Volts / CELL	Watts per cell TIME IN MINUTES 15	30	45	END Volts / CELL	DISCHARGE DATA Watts Per Cell AT 20 C DISCHARGE TIME IN HOURS 1	1.5	2	3	4	5	6	8	10	12	20	24
12TSG 50	1.80	97.7	63.6	48.3	1.85	40.3	27.6	23.2	17.0	13.5	11.2	9.71	7.90	6.53	5.57	3.65	3.14
	1.75	106	65.8	49.7	1.80	41.3	29.1	24.6	17.9	14.2	11.8	10.3	8.33	6.91	5.92	3.88	3.29
	1.67	111	67.3	49.9	1.75	41.6	29.6	25.2	18.3	14.5	12.1	10.6	8.47	7.06	6.03	3.96	3.35
12TSG 60	1.80	134	87.4	66.3	1.85	55.4	38.0	31.9	23.4	18.5	15.4	13.3	10.9	8.98	7.65	5.02	4.32
	1.75	146	90.5	68.4	1.80	56.8	40.0	33.9	24.6	19.5	16.3	14.2	11.4	9.50	8.14	5.33	4.52
	1.67	153	92.5	68.7	1.75	57.2	40.8	34.7	25.2	19.9	16.6	14.5	11.6	9.70	8.29	5.44	4.61
12TSG 80	1.80	171	111	84.4	1.85	70.5	48.3	40.6	29.7	23.6	19.6	17.0	13.8	11.4	9.74	6.38	5.50
	1.75	186	115	87.1	1.80	72.3	50.9	43.1	31.4	24.9	20.7	18.0	14.6	12.1	10.4	6.78	5.75
	1.67	195	118	87.4	1.75	72.8	51.9	44.2	32.0	25.4	21.1	18.5	14.8	12.3	10.5	6.92	5.86
12TSG 90	1.80	191	124	94.1	1.85	78.6	53.8	45.3	33.1	26.3	21.9	18.9	15.4	12.7	10.9	7.11	6.12
	1.75	207	128	97.0	1.80	80.5	56.7	48.0	34.9	27.7	23.1	20.1	16.2	13.5	11.5	7.56	6.41
	1.67	217	131	97.4	1.75	81.1	57.8	49.2	35.7	28.3	23.5	20.6	16.5	13.8	11.8	7.71	6.53
12TSG 100	1.80	220	143	109	1.85	90.7	62.1	52.2	38.2	30.3	25.3	21.8	17.8	14.7	12.5	8.21	7.07
	1.75	239	148	112	1.80	92.9	65.4	55.4	40.3	32.0	26.6	23.2	18.7	15.5	13.3	8.72	7.39
	1.67	251	151	112	1.75	93.6	66.7	56.8	41.2	32.6	27.2	23.7	19.1	15.9	13.6	8.90	7.54
12TSG 110	1.80	244	159	121	1.85	101	69.0	58.0	42.5	33.7	28.1	24.3	19.7	16.3	13.9	9.12	7.85
	1.75	265	165	124	1.80	103	72.7	61.6	44.8	35.5	29.6	25.7	20.8	17.3	14.8	9.69	8.21
	1.67	278	168	125	1.75	104	74.1	63.1	45.7	36.2	30.2	26.4	21.2	17.6	15.1	9.89	8.37
12TSG 120	1.80	269	175	133	1.85	111	75.9	63.8	46.7	37.1	30.9	26.7	21.7	18.0	15.3	10.0	8.64
	1.75	292	181	137	1.80	114	79.9	67.7	49.3	39.1	32.6	28.3	22.9	19.0	16.3	10.7	9.03
	1.67	306	185	137	1.75	114	81.5	69.4	50.3	39.9	33.2	29.0	23.3	19.4	16.6	10.9	9.21
12TSG 130	1.80	293	191	145	1.85	121	82.8	69.6	51.0	40.5	33.7	29.1	23.7	19.6	18.2	10.9	9.42
	1.75	318	197	149	1.80	124	87.2	73.9	53.8	42.7	35.5	30.9	25.0	20.7	19.4	11.6	9.86
	1.67	334	202	150	1.75	125	88.9	75.7	54.9	43.5	36.2	31.7	25.4	21.2	19.7	11.9	10.0
12TSG 150	1.80	332	216	164	1.85	137	93.9	78.9	57.8	45.8	38.2	33.0	26.9	22.2	18.9	12.4	10.7
	1.75	360	224	169	1.80	140	98.8	83.7	60.9	48.3	40.3	35.0	28.3	23.5	20.1	13.2	11.2
	1.67	379	229	170	1.75	141	101	85.8	62.2	49.3	41.1	35.9	28.8	24.0	20.5	13.5	11.4
12TSG 170	1.80	401	261	198	1.85	165	113	95.2	69.7	55.3	46.0	39.8	32.4	26.8	22.8	15.0	12.9
	1.75	435	270	204	1.80	169	119	101	73.5	58.3	48.5	42.2	34.1	28.3	24.3	15.9	13.5
	1.67	457	276	205	1.75	171	122	103	75.0	59.4	49.5	43.3	34.7	28.9	24.7	16.2	13.7
12TSG 210*	1.80	464	302	229	1.85	191	131	110	80.7	64.0	53.3	46.1	37.5	31.0	26.4	17.3	14.9
	1.75	504	313	236	1.80	196	138	117	85.1	67.5	56.2	48.9	39.6	32.8	28.1	18.4	15.6
	1.67	529	320	237	1.75	198	141	120	86.9	68.8	57.4	50.1	40.2	33.5	28.6	18.8	15.9
12TSG 250	1.80	574	374	283	1.85	237	162	136	99.9	79.2	65.9	57.0	46.4	38.4	32.7	21.4	18.5
	1.75	623	387	292	1.80	243	171	145	105	83.5	69.6	60.5	48.9	40.6	34.8	22.8	19.3
	1.67	654	395	293	1.75	244	174	148	107	85.1	70.9	62.0	49.7	41.5	35.4	23.2	19.7

Actual Battery Discharge Data may be +/-5% of figures shown. * Gel sizes not available until mid 2006



Benefits of Catalyst in SEC VRLA Batteries



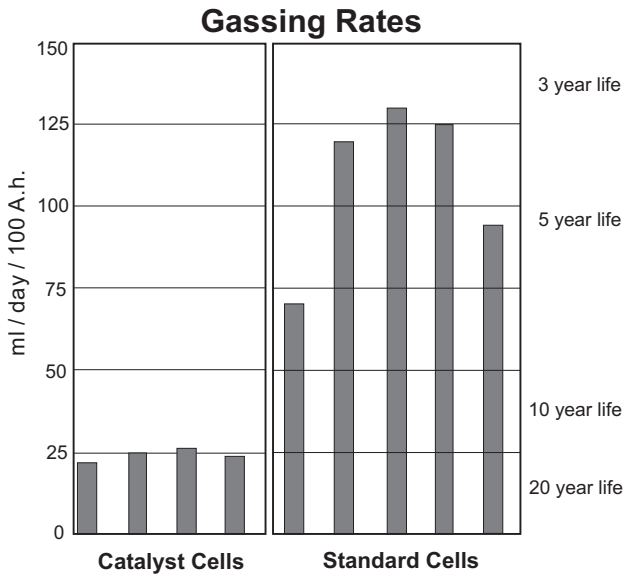
Catalyst Reduces Float Current
One of the most immediate, observable effects of installing a catalyst in a VRLA cell is a sudden drop in the float current. Typically float currents are one half or less when a catalyst is installed. Adding a catalyst to the cell prevents some of the oxygen reaching the negative plate and allows the negative plate to stay polarised. This means that less current needs to be supplied to the cell from the charging system, manifesting itself as lower float current, leading to the following benefit :-

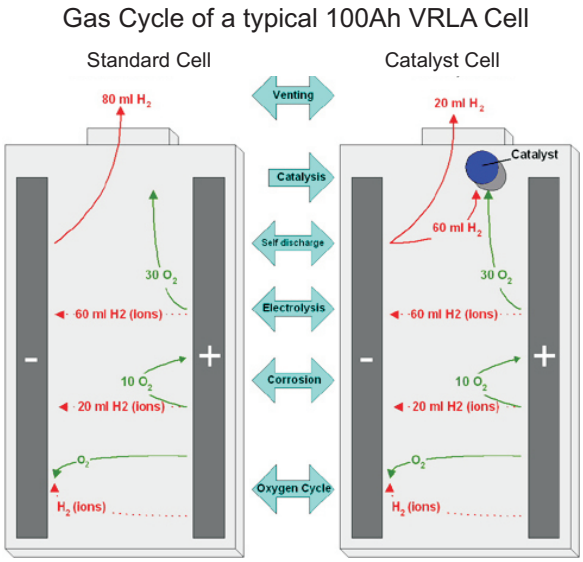
*** Minimize water loss**
Gasses are recombined into water inside the cell rather than exiting the cell. Too much gas leaving the cell can lead to premature dry-out and cell failure. Cell dry out has been predominant cause of customer dissatisfaction with VRLA technology.

*** Increased life**
There are many potential failure modes of VRLA cells. A number of these failure modes can be mitigated by the catalyst technology such as: Cell dry out, positive plate corrosion, thermal runaway, capacity loss due to negative plate depolarization.

*** Minimize positive plate corrosion**
A reduction in float current reduces the amount of over-charge on the positive plate which directly impacts the corrosion rate. The design life of a lead acid cell is based on the corrosion of the plate barring any other unforeseen failure modes.

*** Maintain cell capacity**
Many VRLA cells in service are failing capacity tests because their negative plates are depolarized In fact significant capacity increases have been seen on some cells just by installing a catalyst.





How it works

The VRLA cell was designed to correct all the problems of flooded technology. All the gas produced inside the cell was intended to recombine back into water on the negative plate in a very efficient oxygen cycle. In an ideal world there would be no negative plate self discharge, no positive plate corrosion and no excess charge current needed. Batteries would last forever and no gas would be released from the cell.

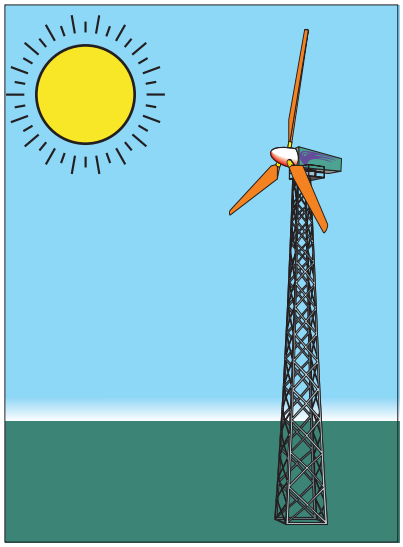
In the real world, chemistry dictates that negative plates do self-discharge and they do this more when impurities are present in higher quantities. In our experience the typical high quality, long life (20 yr) VRLA cell has a self discharge rate equivalent to 80 ml of Hydrogen gas per day per 100 Ah. Oxygen, produced from a variety of processes on the positive plate, will recombine with this hydrogen on the negative plate and cause it to depolarize.

In the real world positive grids also corrode. Designers have done what is typically done on flooded designs for long life and reduced the corrosion rate of the positive grid. Typical state of the art designs will only absorb 10 ml of oxygen on the positive plate instead of the 40 ml needed to counter act the hydrogen generated on the negative. This is the paradox of VRLA design. A "better" positive grid can actually impair the life of the design.

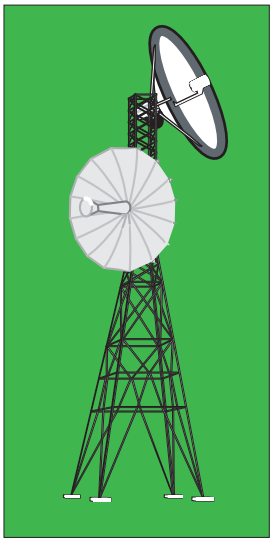
This leaves an unbalanced situation with a strongly depolarized negative plate. The charging system will compensate with more current which will lead to excessively high polarization on the positive plate and damaging effects on the cell due to the excess current. Electrolysis will generate high amounts of gas leading to water loss.

Adding a Microcat™ to the cell gives the battery designer a new tool to break out of the deadlock. The catalyst will absorb free oxygen in the headspace and recombine it with the abundant hydrogen always present in the cell. This drastically reduces the amount of gas venting from the cell, but most importantly this prevents oxygen from reaching the negative plate and buffers the negative plate self discharge reaction from the positive plate corrosion reaction. Now that the cell is in balance the negative remains charged. The charging system responds by only sending the small amount of current needed to keep the cell charged.

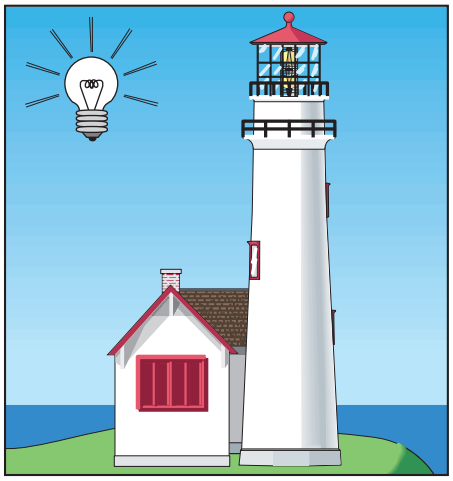
Typical Solar Gel Battery Applications



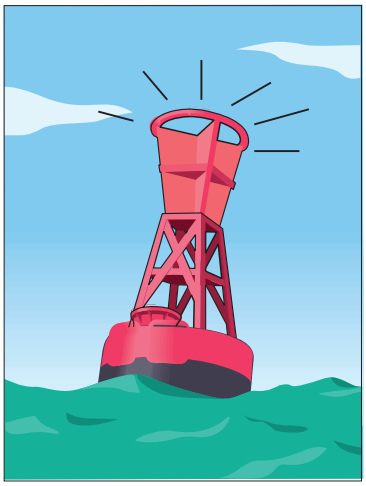
SOLAR FOR RENEWABLE ENERGY AND WIND GENERATION



SOLAR FOR REMOTE AREA TELECOMMUNICATIONS



SOLAR FOR ISOLATED LIGHT HOUSES



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