EXIDE INDUSTRIAL

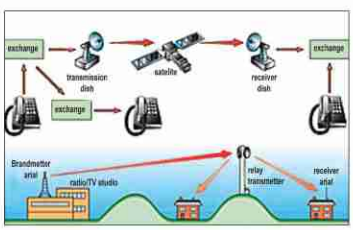
EXIDE Powersafe

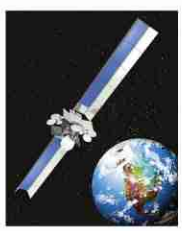
SEALED MAINTENANCE FREE VRLA BATTERIES FOR TELECOM APPLICATION

EXIDE INDUSTRIAL

Introduction to EXIDE

- India's number one storage battery manufacturing company, having one of the largest range of batteries in the world covering the entire gamut of applications from motor cycles to large commercial vehicles; from small UPS batteries to gigantic Submarine batteries
- Market leader in battery business for more than half a century
- Largest network in India with 4 Regional Offices, 24 Branch Offices & 30 Power Centres
- 8 factories strategically located across the country, with each factory specializing on specific range of products
- Full fledged in-house R&D facility in Kolkata backed by long term strategic and technical collaborations with other leading global manufacturers like
  - Shin Kobe Electric Machinary Co., Japan
  - The Furukawa battery Co., Japan
- ISO 9001 certified organization
- ISO 14001 certified Eco friendly manufacturing process
- Most reliable power back up provider for Telecommunication Applications for both mobile and fixed networks



The Technical Edge of SMF VRLA Battery of Exide

HASSLE FREE HANDLING & EASY INSTALLATION

- No water topping up required ever resulting in saving of hundreds of litres of distilled water and manpower required for topping up throughout life of the battery.
- Factory Charged & Ready to use and hence no delay between receipt and use resulting in instant power source.
- Modular design ensures easy handling and Installation hence does not require any specially trained manpower for installation.
- Sealed with no free acid.

SPACE ECONOMY

- Sealed construction allows use in any orientation without leakage / spillage, without affecting the performance and hence resulting in saving of floor space.

ECO FRIENDLY

- Superior Cadmium free grid alloy
- The gas recombination technology cycle effectively nullifies generation of gas during normal use resulting in no emission of corrosive fumes under normal operative conditions and hence no elaborate air exhaust system is required.

SUPERIOR PERFORMANCE

- Enhanced plate length for high power density
- Excellent recovery from deep discharge
- Low self discharge

SAFETY

- Better Thermal Management in the system
- Resistant to thermal runaway due to lead calcium tin alloy
- Flame Arrestor fitted safety valve.

LIFE

- Service life comparable with the best of the international makes.
- Designed life is 20 yrs at 27°C under ideal float condition
- 4000 cycles at 20 % DOD
- 1800 cycles at 50 % DOD
- 1400 cycles at 80 % DOD

LOW SELF DISCHARGE

- Antimony free alloy and hence self discharge less than 0.5% per week of C_{10} capacity at 27°C
- Low self discharge allows the battery to be stored for 3-6 months depending on ambient temperature and with occasional freshening charges, there is no subsequent loss of performance.

PERFORMANCE CONFORMING TO :

TEC : GR/BAT-01/03.MAR 2004 with latest amendment

JIS : C 8704 – 2 : 1999

IEC : 60896 – 21 & 22

ANSI : T1 330 (US specification for Telecom battery)

RDSO : IRS S93-96 with latest amendment

Float voltage settings

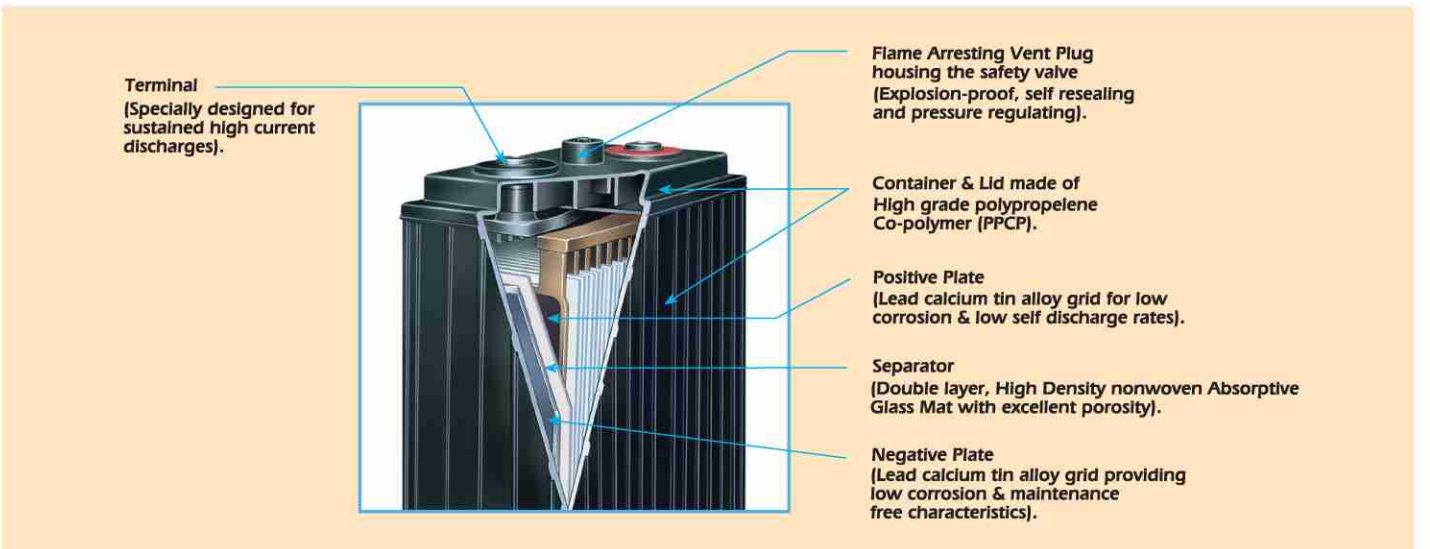
- **Recommended Float Voltages**

AMBIENT TEMP (°C)	RECOMMENDED FLOAT VOLTAGE PER CELL (VOLT)	MAXIMUM CHARGING CURRENT (AMPERE)
-5 to 14	2.27+/-0.02	0.15C
15 to 24	2.25+/-0.02	0.15C
25 to 34	2.23+/-0.02	0.15C
35 to 40	2.20+/-0.02	0.15C

C : Nominal 10 hr. capacity of the battery at 27°C

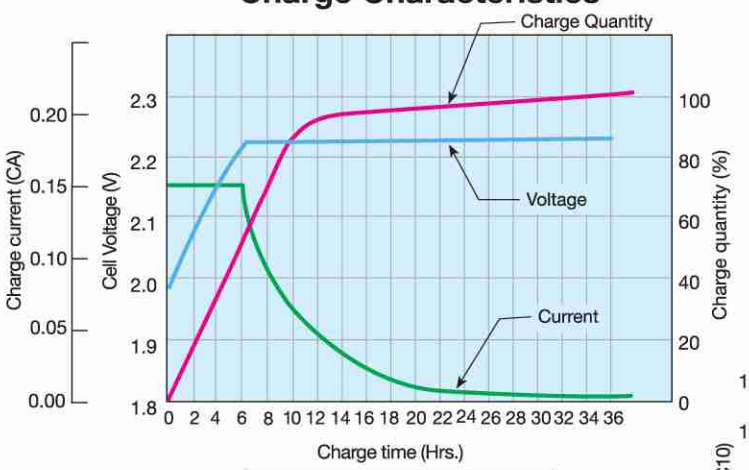
Exploded diagram of cell with basic reaction diagram

Construction



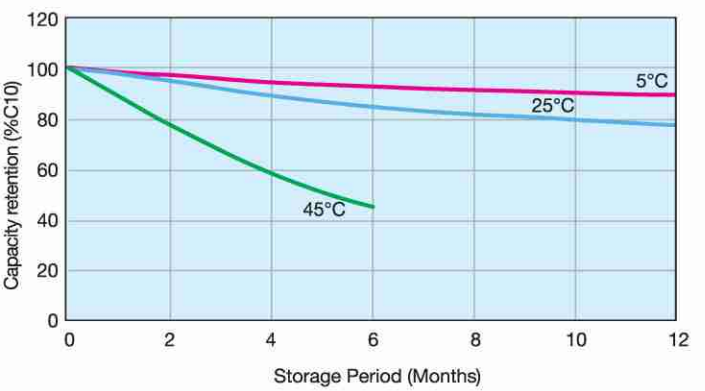
Characteristics of VRLA Batteries

Charge Characteristics



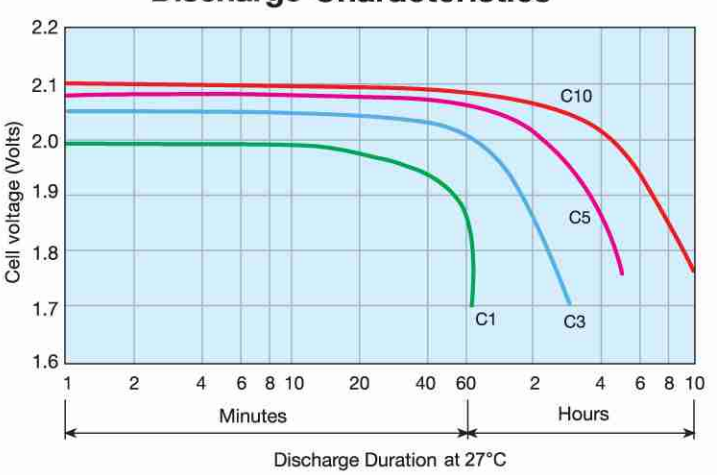
Temperature	:	27°C
Discharge	:	100% C10 rate
Recharge	:	2.23 vpc 0.15C Amps

Capacity Retention Characteristics

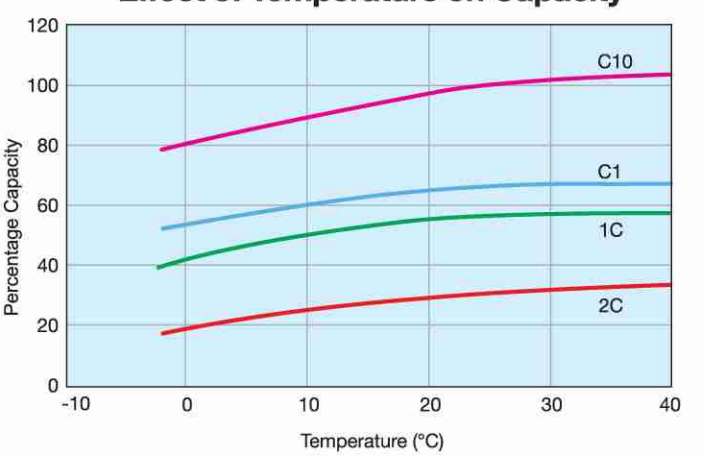


- Supplementary charge is recommended before capacity retention ratio drops less than 80%.

Discharge Characteristics



Effect of Temperature on Capacity



Technical Specifications

Table 1a : NEPST Module Dimension

Battery type	Capacity @ 10 hr/ 1.75V	Module nominal voltage	Module dimension			Weight (Kg) +/- 5%
			L(mm) +/- 5	D(mm) +/- 5	H(mm) +/- 5	
NEPST	200	12	703	423	268	87
NEPST	240	12	703	423	268	96
NEPST	280	12	703	423	268	108
NEPST	300	12	682	424	292	114
NEPST	400	8	733	415	236	118

Table 1b : MST / NMST Module Dimension

Battery type	Capacity @ 10 hr/ 1.75V	Module nominal voltage	Module dimension			Weight (Kg) +/- 5%
			L(mm) +/- 5	D(mm) +/- 5	H(mm) +/- 5	
NMST	500	8	789	540	255	148
NMST	600	8	789	540	255	166
NMST	800	4	462	540	363	122
NMST	1000	4	462	540	363	145
NMST	1250	4	436	540	511	179
NMST	1500	4	436	540	511	200
NMST	2000	2	436	540	363	145
NMST	2500	2	436	540	511	179
NMST	3000	2	436	540	511	200
NMST	4000	2	872	540	363	290
NMST	5000	2	872	540	511	358
NMST	6000	2	872	540	511	400

Table 2a : NEPST 48V System Configuration & Overall Dimension

Battery type	Capacity @ 10 hr/ 1.75V	Stacking	Overall dimension			Weight (Kg) +/- 5%
			L(mm) +/- 5	D(mm) +/- 5	H(mm) +/- 10	
NEPST	200	1 stack, 4 mod /stack	703	423	1122	352
NEPST	240	1 stack, 4 mod /stack	703	423	1122	388
NEPST	280	1 stack, 4mod /stack	703	423	1122	436
NEPST	300	1 stack, 4 mod /stack	682	424	1218	460
NEPST	400	1 stack, 4 mod /stack	733	415	1541	710

Table 2b : MST / NMST 48V System Configuration & Overall Dimension

Battery type	Capacity @ 10 hr/ 1.75V	Stacking	Overall dimension			Weight (Kg) +/- 5%
			L(mm) +/- 10	D(mm) +/- 10	H(mm) +/- 10	
NMST	500	1 Stack, 6mod /stack	789	540	1655	893
NMST	600	1 Stack, 6mod /stack	789	540	1655	1002
NMST	800	3 Stack, 4 mod / stack	1386	540	1577	1479
NMST	1000	3 Stack, 4 mod / stack	1386	540	1577	1635
NMST	1250	4 Stack, 3 mod / stack	1744	540	1658	2194
NMST	1500	4 Stack, 3 mod / stack	1744	540	1658	2446
NMST	2000	6 Stack, 4 mod / stack	2616	540	1573	3550
NMST	2500	6 Stack, 4 mod/ stack	2616	540	2169	4365
NMST	3000	8 Stack, 3 mod / stack	3488	540	1658	4892
NMST	4000	12 Stack, 4 mod / stack (Linear)	5232	540	1573	7100
NMST	4000	12 Stack, 4 mod / stack (Back to Back)	2616	1240	1573	7100
NMST	5000	12 Stack, 4 mod / stack (Linear)	5232	540	2169	8730
NMST	5000	12 Stack, 4 mod / stack (Back to Back)	2616	1240	2169	8730
NMST	6000	16 Stack, 3 mod / stack (Linear)	6976	540	1658	9784

Table 3a : NEPST 24 V System Configuration & Overall Dimension

Battery type	Capacity @ 10 hr/ 1.75V	Stacking	Overall dimension			Weight (Kg) +/- 5%
			L(mm) +/- 5	D(mm) +/- 5	H(mm) +/- 5	
NEPST	200	1 stack, 2 mod /stack	703	423	586	180
NEPST	240	1 stack, 2 mod /stack	703	423	586	200
NEPST	280	1 stack, 2 mod /stack	703	423	586	220
NEPST	300	1 stack, 2 mod /stack	682	424	634	235
NEPST	400	1 stack, 2 mod /stack	733	415	833	364

Table 3b : MST & NMST 24V System Configuration & Overall Dimension

Battery type	Capacity @ 10 hr/ 1.75V	Stacking	Overall dimension			Weight (Kg) +/- 5%
			L(mm) +/- 10	D(mm) +/- 10	H(mm) +/- 10	
NMST	500	1 Stack, 3mod /stack	789	540	828	447
NMST	600	1 Stack, 3mod /stack	789	540	828	501
NMST	800	3 Stack, 2 mod / stack	1386	540	789	740
NMST	1000	3 Stack, 2 mod / stack	1386	540	789	818
NMST	1250	2 Stack, 3 mod / stack	872	540	1658	1097
NMST	1500	2 Stack, 3 mod / stack	872	540	1658	1223
NMST	2000	3 Stack, 4 mod / stack	1308	540	1573	1775
NMST	2500	3 Stack, 4 mod / stack	1308	540	2169	2194
NMST	3000	4 Stack, 3 mod / stack	1744	540	1658	2446
NMST	4000	6 Stack, 4 mod / stack (Linear)	2616	540	1573	3550
NMST	5000	6 Stack, 4 mod / stack (Linear)	2616	540	2169	4365
NMST	6000	8 Stack, 3 mod / stack (Linear)	3488	540	1658	4892

Discharge Current in Amps at 27°C

Table 4a : NEPST Range

	AH	ECV	30min	60min	90min	2hrs	3hrs	4hrs	5hrs	6hrs	8hrs	10hrs
NEPST	200	1.80	118	91	76	66	49	40	34	29	24	20
		1.75	148	108	85	71	53	43	35	31	25	21
		1.70	154	111	87	73	54	43	36	32	25	21
NEPST	240	1.80	141	109	91	79	59	48	40	35	28	24
		1.75	178	129	102	85	63	51	42	37	30	25
		1.70	185	133	105	87	65	52	44	38	30	26
NEPST	280	1.80	165	127	106	92	68	56	47	41	33	28
		1.75	207	151	119	99	74	60	49	43	35	29
		1.70	215	156	122	102	75	61	51	44	35	30
NEPST	300	1.80	176	136	114	98	73	60	50	44	36	30
		1.75	222	161	127	106	79	64	53	47	37	31
		1.70	231	167	131	109	81	65	55	48	38	32
NEPST	320	1.80	188	145	122	105	78	64	54	47	38	32
		1.75	237	172	136	113	84	68	56	50	40	33
		1.70	246	178	140	116	86	70	58	51	41	34

Discharge Current in Amps at 27°C

Table 4b : MST & NMST Range

	AH	ECV	30min	60min	90min	2hrs	3hrs	4hrs	5hrs	6hrs	8hrs	10hrs
MST	400	1.80	235	182	152	131	98	80	67	59	47	40
		1.75	296	215	169	142	105	85	70	62	50	41
		1.70	308	222	175	145	108	87	73	63	51	43
NMST	500	1.80	294	227	190	164	122	100	84	74	59	50
		1.75	370	269	212	177	132	106	88	78	62	52
		1.70	385	278	218	182	134	109	91	79	63	53
NMST	600	1.80	353	273	228	197	146	120	101	88	71	60
		1.75	444	323	254	213	158	128	106	93	74	62
		1.70	462	333	262	218	161	130	109	95	76	64
NMST	800	1.80	471	364	304	262	195	160	134	118	95	80
		1.75	593	430	339	284	211	170	141	124	99	83
		1.70	615	444	349	291	215	174	145	127	101	85
NMST	1000	1.80	588	455	380	328	244	200	168	147	118	100
		1.75	741	538	424	355	263	213	176	155	124	104
		1.70	769	556	437	364	269	217	182	159	127	106
NMST	1250	1.80	735	568	475	410	305	250	210	184	148	125
		1.75	926	672	530	443	329	266	220	194	155	130
		1.70	962	694	546	455	336	272	227	198	158	133
NMST	1500	1.80	882	682	570	492	366	300	252	221	178	150
		1.75	1111	806	636	532	395	319	264	233	186	155
		1.70	1154	833	655	545	403	326	273	238	190	160
NMST	2000	1.80	1176	909	760	656	488	400	336	294	237	200
		1.75	1481	1075	847	709	526	426	352	310	248	207
		1.70	1538	1111	873	727	538	435	364	317	253	213
NMST	2500	1.80	1471	1136	951	820	610	500	420	368	296	250
		1.75	1852	1344	1059	887	658	532	441	388	310	259
		1.70	1923	1389	1092	909	672	543	455	397	316	266
NMST	3000	1.80	1765	1364	1141	984	732	600	504	441	355	300
		1.75	2222	1613	1271	1064	789	638	529	465	372	311
		1.70	2308	1667	1310	1091	806	652	545	476	380	319
NMST	4000	1.80	2353	1818	1521	1311	976	800	672	588	473	400
		1.75	2963	2151	1695	1418	1053	851	705	620	495	415
		1.70	3077	2222	1747	1455	1075	870	727	635	506	426
NMST	5000	1.80	2941	2273	1901	1639	1220	1000	840	735	592	500
		1.75	3704	2688	2119	1773	1316	1064	881	775	619	518
		1.70	3846	2778	2183	1818	1344	1087	909	794	633	532
NMST	6000	1.80	3529	2727	2281	1967	1463	1200	1008	882	710	600
		1.75	4444	3226	2542	2128	1579	1277	1057	930	743	622
		1.70	4615	3333	2620	2182	1613	1304	1091	952	759	638

Additional Information Regarding Exide Powersafe

Heat Dissipation:

A VRLA battery under normal float condition shall dissipate heat into the atmosphere. For the overall heat load calculation, taking into account a worst case operation, the rate of heat dissipation may be taken as 0.45 Watts/100 Ah C_{10} capacity/cell.

Hydrogen Evolution:

Hydrogen gas evolved by a lead acid battery may be estimated from the following formula: Hydrogen gas evolved per hour = $0.45 \times 10^{-3} \times n \times I \times C$ m^3 at N.T.P.

where, n = number of 2V cells

I = Float current, 0.2 A/100 Ah for a VRLA cell

C = C_{10} capacity of Cell

To design for the ventilation (air flow) requirement so that the hydrogen percentage in the air is always below 4% (lower explosive limit), the air flow rate may be estimated as:

$Q = d \times s \times 0.45 \times 10^{-3} \times n \times I \times C$ m^3/hr

Where, d = dilution ratio (100 - 4)/4 = 24
S = factor of safety, e.g. 5

For a VRLA, the above may be simplified as:
$Q = 0.0108 \times n \times C$

Ripple Current:

VRLA batteries should be charged by pure D.C. source only. For optimum life the A.C. ripple content should not exceed 5A per 100 Ah C_{10} capacity.

Overdischarge:

Compared to the alkaline battery, the sealed lead acid battery is very sensitive to overdischarge resulting in failure to recover to normal capacity i.e reduction in capacity and shortened service life. Overdischarge also occurs by leaving the battery in a discharged state. The Exide powersafe VRLA type sealed lead acid battery overcomes this due to its alloy composition. If this battery is overdischarged and left standing in a discharged state for a few days, it can recover its original capacity when charged. However, it is recommended to avoid overdischarge situations as much as possible. Also check the following points when charging

Precautions:

(1) Always perform constant voltage charging with 2.35 V/cell or constant current charging with 0.05 CA. The charge voltage of 2.25 V/cell may not be enough to recover to the capacity above.In this case repeat charge and discharge two or three times.

(2) The original capacity can be recovered after two or three consecutive charge-discharge cycles. Beyond this limit, the battery may not recover its original capacity.

FAQ's

What is a VRLA battery ?

VRLA stands for Valve Regulated Lead Acid battery where-in a valve is used to vent out the excess evolved Hydrogen. Concept of a VRLA battery is evolved, to make the practice of topping up obsolete. Exide Powersafe employs Absorptive Glass Matt (AGM) separator technology in the VRLA batteries.

At any point of time VRLA battery should not be topped up with water. Conversely, any battery that demands water after cycling cannot be a VRLA battery.

What are the parameters on which capacity of a battery is declared ?

Capacity of battery is declared with respect to rate of discharge , cut off voltage and temperature e.g. 1000 Ah @ C 10 to 1.75 End Cell Voltage (E.C.V) at 27°C means a discharge of 100 A (=1000Ah / 10h) from the battery for 10 hours at 27°C will result in end cell voltage of 1.75 V. 100 % capacity is obtained only during discharge at nominal rate of discharge. For higher rates, discharge curve / table to be referred.

When is the time to change a battery bank ?

Capacity (Ah) given by a battery diminishes with age and when it reaches 80 % of the rated capacity, battery bank needs to be changed. In the above example, if a 1000 Ah battery bank reaches 1.75 Volt per cell at the 8th hour while discharging 100 Amperes, battery has reached it's end of life.

Which type of charger is recommended for Exide Powersafe VRLA ?

Constant Potential chargers with current limit facility (Constant Current Constant Potential type) chargers are to be used for charging VRLA batteries. Recharge current maximum limit to be set at 15 % of the rated capacity.

How does the alloy help in delivering better performance & What makes Exide Powersafe batteries give a better float performance ?

Alloy used in plates plays a major role in terms of battery performance & life. The float current requirement is totally dependent on alloy composition. Various types of alloys are used in plates of VRLA battery. Exide Powersafe uses Lead Calcium Tin alloy in both positive & negative plates. It is technically established that this alloy requires minimum float current than all other types of alloys like lead antimony or cadmium. This gives Exide Powersafe VRLA batteries a clear edge over other makes in terms of performance & life of battery in float application.

What is the advantage of modular arrangement in VRLA batteries ?

Modules can be stacked one over the other and overall bank dimension can be adjusted to meet the site requirement both in terms of foot print and floor loading.

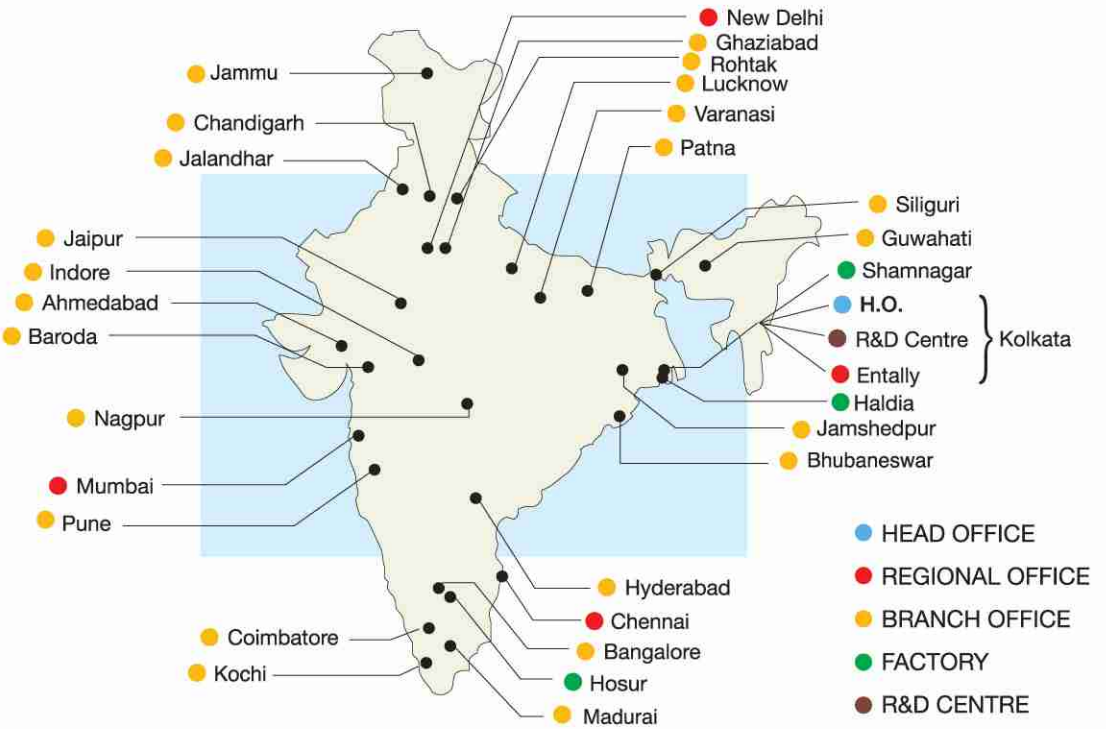
Why freshening charge is required in batteries even if the batteries are not discharged by external load ?

A battery gets discharged on its own when kept in idle condition (Not connected to load). This phenomenon is called as self discharge which is governed by the grid alloy, ambient temperature and other factors. In order to compensate the charge lost in self discharge, batteries are to be given a freshening charge on a periodic basis. Batteries are always put on a float mode for the same reason , where the battery picks up the required charge to remain in a full charge condition.

Is there any requirement of a separate battery room for VRLA batteries ?

Immobilised electrolyte ensures that there is no free acid in the VRLA battery. TIG welding followed by epoxy resin sealing ensures double assurance against acid leakage. Oxygen recombination technology effectively nullifies generation of gas during normal use. Hence there is no need for a separate battery room with costly acid proof flooring and elaborate air exhaust system as in conventional flooded installations.

NETWORK



EXIDE INDUSTRIAL

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Registered Office : Exide Industries Ltd., Exide House, 59E, Chowringhee Road, Kolkata 700 020, Ph : (033) 2283 2120/2133, Fax : (033) 2283 2637/2283 2632 **Corporate Marketing Office :** 6A, Hatibagan Road, Kolkata - 700 014, Ph : (033) 2286 6158/59, Fax : (033) 2286 6186, **Factory Address** : **Hosur** Survey No. 246, Chinchurakanapalli Village, Sevaganapally Panchayat, Hosur Taluk, Dharmapuri Dist., Tamil Nadu - 635 103 Ph : (04344) 258251/258253, Fax : (04344) 258255, **R&D Address** : 217, Nazrul Islam Avenue, Kolkata - 700 059, Ph : (033) 2500 5458/5225/5660, Fax : (33) 2500 5545

Regional & Branch Offices :
New Delhi : 'Exide House', 3E/1 Jhandewalan Extension, Link Road, New Delhi - 110055, Ph. : (011) 23627095/96/97/98, Fax : (011) 23555703 **Mumbai :**"RAHEJAS', 5th Floor, 8C Main Avenue. V.P. Road, Santacruz (West), Mumbai - 400 054, Ph: (022) 26465283/5284/5042, Fax: (022) 26465042, **Chennai :** 'Exide House', 21/22, Alandur Road, Guindy, Chennai-600032, Ph. : (044) 2250 0726 / 1326, 2250 0725 (Direct), Fax : (044) 2250 1216, **Kolkata :** 6A Hatibagan Road, Kolkata-700014, Ph. : (033) 22464560/90/22843137/2246 4563, Fax : (033) 22446555, **NORTH, Lucknow :** Exide Industries Limited, 11 M. G. Marg, Habibullah Estate, Hazratganj, Lucknow-226001, Ph. : (0522) 2220722/6971/2215280/281, Fax : (0522) 2218089, **Chandigarh :** Exide Industries Limited, Exide House, 177 H & I Industrial Area, Phase - 1, Chandigarh -160002, Ph. : (0172) 2654387/ 4553, Fax : (0172) 2654395, **Ghaziabad** : Exide Industries Limited, D-42 Patel Nagar 2nd, Ghaziabad, Ph. : (0120) 24734574, **Jalandhar :** Exide Industries Limited, Exide House, G. T. Road, Jalandhar-144001, Ph. : (0181) 2237870/874, Fax : (0181) 2459571, **Jaipur :** Exide Industries Limited, 65A, Suraj Nagar(w) Sodala, Ajmer Road, Jaipur 302006, Ph. : (0141) 2293704/2218004, Fax : (0141) 2369744, **Jammu :** Exide Industries Limited, Gupta Trading Co., Shop No. 194/6, Transport Nagar, Jammu, Ph.: (0191) 2476 377/577, **Rohtak : (Haryana)**: Exide Industries Limited, 355/7, Babra Mahalla, Mata Gate, Rohtak (Haryana), Ph.: (01262) 245176, **SOUTH, Bangalore :** Exide Industries Limited, No 43/1, Rub Plaza, Industrial Suburb, Tumkur Road Yashwantpur Bangalore-560022, Ph. : (080) 2357 8672 / 41283493-95, Fax : 25599624, **Kochi :** Exide Industries Limited, No. 44/3331, Near TVS, Kaloor North, Kochi-682017, Ph. : (0484) 2409128 - Direct, Fax : (0484) 2537869, **Hyderabad** : Exide Industries Limited, 6-3571/2 Rockdale Compound, Somajiguda, Hyderabad 49, Ph. : (040) 26663958-Direct/23314826/4830, Fax : (040) 23399050, **Coimbatore :** Exide Industries Limited, No.29, Race Course Road, Opp. Masonic Hospital,, Coimbatore-641018, Ph.: (0422) 2211737/1846, Fax : (0422) 2211296, **WEST :** Apeejay Chambers, Wallace Street, Fort, Mumbai-400001, Ph. : (022) 2646 5283/2646 5284, Fax (022) 22078631, **Ahmedabad :** Exide Industries Limited201, Shubham Complex, Opp. Prerna Towers, Corner of Sunrise Park, Vastrapur, Ahmedabad 380001, Ph. : (079) 26856697 (Direct)/26698/9661, Fax : (079) 26752611, **Nagpur :** Exide Industries Limited, Exide House, Katol Road, Nagpur - 440013, Ph. : (0712) 561 5883/1140/259 4722, Fax : (0712) 2541479, **Indore** : Exide Industries Limited, 9A, Manoramaganj, Opp. DIG Bunglow, A. B. Road, Indore- 452001, Ph. : (0731) 2491337/3395/2493163, Fax : (0731) 2493395, **Vadodara :** A/21, Gulabvatika, Tandalya Road, Old pandra road, Vadodara - 390 007, Ph : (0265) 2354240, Fax : (0265) 56011083/84/85/86, **Pune :** Exide Industries Limited, 1, Riverview Apts. # 4, North Main Road, Koregaon Park, Pune - 411 001, Ph. : (020) 24011083/84/85/86, Fax : (020) 2612 6426, **EAST : Bhubaneswar**, Plot No. 362/3855, Ananta Niwas, Opp. Bhubaneswar Municipal Corpn., Goutam Nagar, Bhubaneswar - 751 014, Ph. 0674 2431385/1847, **Jamshedpur :** Exide Industries Limited, Room No. 309, Yash Kamal Complex, 3rd Floor, Main Road, Bistupur, Jamshedpur, Ph : (0657) 2426 847, Fax : (0657) 2428349/435152, Guwahati : Exide Industries Limited, C/o Al & C. Co. G S Road, Near car Ghar, Ganeshguri, Dispur, **Guwahati** : 781 005, Ph : (0361) 220500/220119, **Patna** : Exide Industries Limited, B/25 Shrikrishna Puri, Patna (Bihar)-800 001, Ph. : (0612) 2231569/2226632/211040, Fax : (0612) 2231569

Caps/VRLA/P2/REVO/1K/28/07/2008