



EXIDE

OPzS
TUBULAR BATTERIES



CLEAR ADVANTAGE

INDUSTRIAL



Exide / Chloride OPzS, branded as Törrsafe, is the new addition in its Tubular range. It comes in transparent SAN Container in line with the latest international trend. Exide OPzS range essentially packs the time tested and robust tubular plate design in a transparent polymer cell box and matching lids. The cells are designed to conform international specification DIN 40736.

Advantage Exide OPzS

- **Easy monitoring** : The cells are housed in transparent SAN container making it user friendly and easy to monitor
- **Minimum maintenance** : The topping up frequency for Exide OPzS cells is once in 12-18 months
- **Low foot print** : The tall tower type design has a much lower foot print than the conventional system
- **Robust** : The cells are manufactured with Exide's Törr tubular design making it extremely robust and suitable for harsh environment like high ambient and frequent discharges
- **Plastic encapsulated bolt-on terminals**: The corrosion-resistant bolt-on terminals with brass inserts provide better electrical performance and resistance to wear and tear of terminals
- **Insulated intercell connectors** : They offer better conductivity. The insulation protects the connector from acid attack and electric shock
- **Reliable** : They are extremely reliable for standby float applications
- **Long life** : Expected service life is 15 years in standby float application at 27°C

Applications

- Power Plants
- Substations
- Switchgears
- UPS Systems
- Telecommunications
- Process Industries
- Solar Photovoltaic Systems
- Any other critical standby applications



PRODUCT FEATURES

POSITIVE PLATE

Spine

The Positive Plate of the Exide OPzS is of Tubular type. In the OPzS, the spine diameter is in excess of 3mm. This gives the battery longer life and high electrical efficiency.

The raw material for the Spine is Lead-Antimony alloy with Antimony content 1.6-2.5%. Lower Antimony ensures low water loss and low topping up (topping up frequency is between 12 and 18 months) This cuts down maintenance considerably. The alloy is suitably dosed with copper and selenium that helps in achieving low anodic corrosion rate.

Its Törr Tubular spines cast at 100 Bar high pressure on specially imported HADI Machines makes the plates further corrosion resistant.

NON-WOVEN GAUNTLET

To hold the Positive active material, Exide OPzS uses high quality non-woven gauntlets manufactured in-house. Unlike woven gauntlets, non-woven gauntlets have finer pores evenly distributed along their surface. This improves active material retention and consistent output.

Additionally, the Exide OPzS non-woven gauntlets have greater cloth thickness to increase burst strength, thereby bolstering the positive plate life even in the most arduous applications.

NEGATIVE PLATE

The Exide OPzS negative plate is of flat pasted type. These plates with special alloy and innovative plate design accommodates more active material, thereby increasing cyclic performance and battery life.

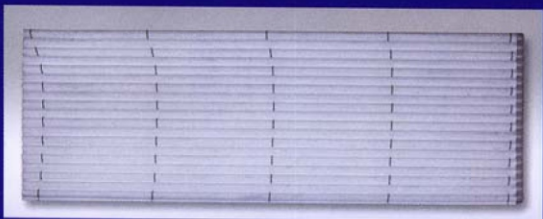
SEPARATOR

The Separators used are imported microporous synthetic separators. They have:

- High temperature stability, mechanical strength, low electrical resistance, high porosity and low acid displacement for greater efficiency
- Small average pore diameters to prevent penetration shorts
- The inherent stability of the separator in the battery makes sure no harmful substances are generated



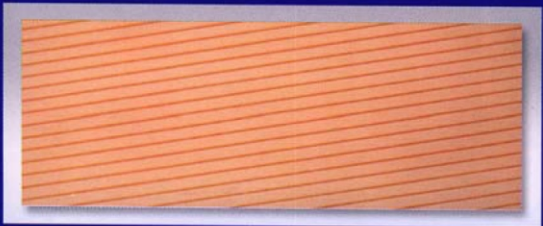
Positive Spine



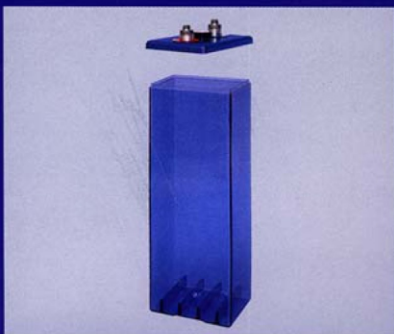
Non-Woven Gauntlet



Negative Plate



Seperator



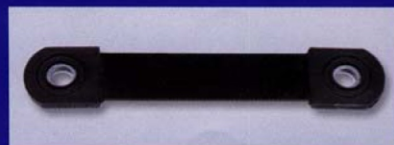
Transparent SAN Container and opaque SAN Lid



Plastic encapsulated bolt-on terminals



Microporous Ceramic Vent Plugs



Insulated Intercell connectors

THE CONTAINER

The container is made of transparent Styrene Acrylo Nitrile (SAN) polymer.

The advantages:

- It enables easy visual monitoring and provides improved aesthetics
- The container material is strong and inert to acid
- The tall tower type design has a comparative lower footprint

PLASTIC ENCAPSULATED BOLT-ON TERMINALS

These are high end bolt - on terminals with Brass inserts to provide better electrical performance

- Terminals have unique double layered protection with a special bonding agent to prevent failure of batteries through crevice corrosion
- The design is such that battery accessories like Connector, Take off etc. are easy to replace
- Bolt-on technology prevents wear and tear of the terminals. This was unavoidable in weld-on terminals

VENT PLUG

The domed vent plugs are made of special grade ceramic. The benefits are as under:

- The ceramic Dome Vent Plug helps in retaining acid inside the cell by efficiently arresting acid fumes
- The innovative vent plug is also very effective in arresting electrolyte spillage, which in turn helps to reduce the top-up frequency

Connector / Fastener

- The global quality insulated connector protect it from acid attack
- The insulation protects operators from electric shocks
- Maintains close contact between the terminals for better conductivity, avoiding DC shorts

Specifications

These cells conform to international specification DIN 40736.

TECHNICAL SPECIFICATIONS OF OPzS CELLS

Cell Type	C10 Capacity upto 1.80 Vpc at 27°C	C3 Capacity upto 1.75 Vpc at 27°C	C1 Capacity upto 1.67 Vpc at 27°C	Dry Wt. +/-5% (Kg.)	Approx. Qty of acid 1.220 sp. gr (Litres)	Filled Wt. +/-5% (kg.)	Overall Cell Dimensions			cell Centre (mm)	Trickle Charge Current	
							L+/-3(mm)	W+/-3 (mm)	H+/-5 (mm)		Min (mA)	Max (mA)
OPzS 100P	100	75	54	8.6	4.5	14.1	206	103	430	112	100	400
OPzS 150P	150	112	81	10.5	4.0	15.4	206	103	430	112	150	600
OPzS 200P	200	150	106	15.7	8.7	26.5	206	145	546	153	200	800
OPzS 250P	250	187	132	19.1	8.2	29.3	206	145	546	153	250	1000
OPzS 300P	300	225	158	22.5	7.6	31.9	206	145	546	153	300	1200
OPzS 350P	350	262	185	24.4	7.2	33.4	206	145	546	153	350	1400
OPzS 420P	420	315	222	25.9	7.0	34.5	206	145	546	153	420	1680
OPzS 500P	500	375	260	30.7	11.0	44.3	206	145	721	153	500	2000
OPzS 600P	600	450	312	35.2	10.0	47.6	206	145	721	153	600	2400
OPzS 700P	700	525	364	44.3	19.0	67.9	233	210	721	220	700	2800
OPzS 800P	800	600	416	48.8	18.0	71.2	233	210	721	220	800	3200
OPzS 900P	900	675	468	53.3	17.0	74.4	233	210	721	220	900	3600
OPzS 1000P	1000	750	520	57.8	16.0	77.6	233	210	721	220	1000	4000
OPzS 1100P	1100	825	572	65.9	28.8	101.6	275	210	871	220	1100	4400
OPzS 1200P	1200	900	624	71.6	26.0	103.9	275	210	871	220	1200	4800
OPzS 1300P	1300	967	645	77.4	25.5	109.0	275	210	871	220	1300	5200
OPzS 1400P	1400	1041	694	80.8	25.1	111.9	275	210	871	220	1400	5600
OPzS 1500P	1500	1116	744	83.2	24.9	114.1	275	210	871	220	1500	6000
OPzS 1600P	1600	1190	793	94.6	39.0	143.0	399	214	847	220	1600	6400
OPzS 1700P	1700	1265	843	100.3	38.3	147.8	399	214	847	220	1700	6800
OPzS 1800P	1800	1339	893	106.0	37.8	152.9	399	214	847	220	1800	7200
OPzS 1900P	1900	1413	942	109.3	37.3	155.6	399	214	847	220	1900	7600
OPzS 2000P	2000	1488	992	111.7	37.0	157.6	399	214	847	220	2000	8000
OPzS 2250P	2250	1674	1116	129.7	46.7	187.6	487	212	847	220	2250	9000
OPzS 2500P	2500	1860	1240	141.1	45.0	196.9	487	212	847	220	2500	10000
OPzS 2750P	2750	2046	1364	154.7	55.4	223.4	576	212	847	220	2750	11000
OPzS 3000P	3000	2232	1488	166.1	53.8	232.8	576	212	847	220	3000	12000

INITIAL CHARGING

- The filling in specific gravity of electrolyte for OPzS cells is 1.220 ± 0.005 at 27°C
- The rest period after the initial acid filling is 12 - 16 hours
- The initial charging current :
Starting Rate : 12% of C₁₀ capacity
Finishing Rate : 6% of C₁₀ capacity
- Total minimum Ah input is 5 times of C₁₀ capacity
- The specific gravity of electrolyte of a fully charged cell is 1.240 ± 0.005 at 27°C

- Recommended float voltage:

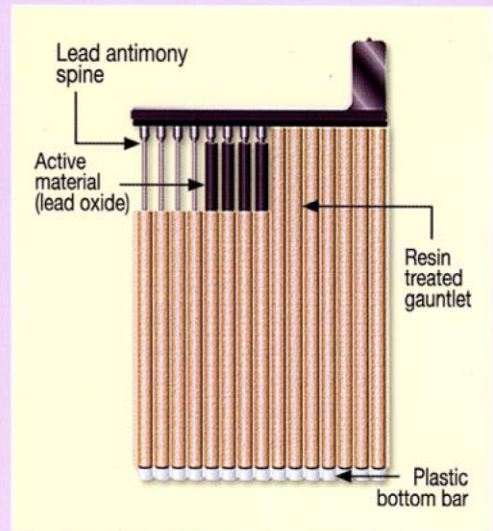
Temperature	Float Voltage
<5°C	2.24 ± 0.02 vpc
5°C – 19°C	2.23 ± 0.02 vpc
20°C – 35°C	2.23 ± 0.02 vpc
36°C – 45°C	2.22 ± 0.02 vpc

Exide TORR TUBULAR Technology

Tubular batteries are widely used for Standby float application. While all tubular Batteries behave similarly in the beginning, the strength of their guts and their life, especially in heavy duties, is decided by the way their spines are cast.

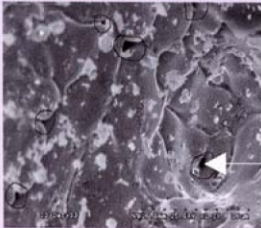
There are three standard casting practices: 1. Gravity Casting 2. Low Pressure Casting 3. High Pressure "HADI" Casting

Exide OPzS Batteries have the spines or the positive plate support made by High Pressure "HADI" Casting Process (100 Bar operating pressure) which can protect the lead plate support from anodic corrosion. The Scanning Electron Microscope (SEM) study reveals the weakness of the plate support made by other processes.



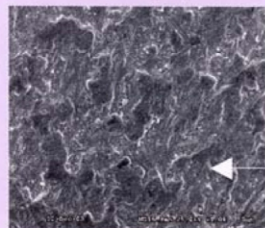
Tubular Plate and its various components

1. Gravity Casting (SEM Picture of plate)



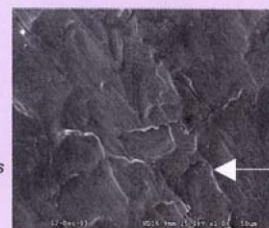
Machine Cost: Rs 50,000/-

2. Low Pressure Casting (10 Bar) (SEM Picture of plate)



Machine Cost: Rs 2 lakhs

3. High Pressure "HADI" Casting (100 Bar) used by EXIDE (SEM Picture of plate)



Machine Cost: 2.5 Crores

Both the low pressure casting and the gravity casting which is used for flat plate manufacturing process show inconsistency in the grain orientation. This can lead to failure by the process known as creep which happens when the plate grows in the charging cycle. Moreover these two casting processes generate casting with open pores. The corrosion process penetrates in the cross section of the plate and leads to early failure compared to the situation where the corrosion is limited to the surface.

Product Comparison by Scanning Electron Microscope Study*

Properties	Gravity	Low Pressure (10 Bar)	High Pressure HADI Casting (100 Bar) used by Exide
Micro hardness (Vicker hardness HV)	Micro hardness is very low compared to the other two varying from 17.5 to 18.2	Micro hardness is not uniform varying from 21.5 to 28.4	Uniform micro hardness of 24.3 throughout the sample
Grain size	Inconsistent grain size	Combination of coarse and fine	Consistent
Grain orientation	Random orientation	Random orientation	Grains are oriented in single direction
Surface condition	Voids are seen and bigger than low pressure casting	Voids are seen (Small black spots)	No voids

* Basis CECRI Report

Insist on "HADI" Bar High Pressure Casting Tubular for long life Standby Batteries

- **Tubular batteries last longer** for 5 to 15 years under proper maintenance condition.
- Highly reliable compared to normal flat plate batteries.
- The spine of Tubular Batteries are made using High pressure **HADI casting** method which ensures long life even under heavy temperature and rough usage.
- Perform consistently under any conditions hence suitable for sensitive and heavy applications.
- Faster charging is one the notable feature in Tubular batteries.
- **Low maintenance** – No need to top-up with **distilled water** frequently.
- Long Standby life compared to flat pasted plate batteries.
- Recommended for **UPS inverters**

Tubular Batteries

Life expectancy 4 to 5 years (Exide EL+ 8 years)
 Low water loss
 Cyclic Life is High
 Operate consistently even at high temperatures.

Suitable for High end applications.

Complex design.

High Price.

Fast charging battery.

Recommended for high productive applications.

Highly reliable

Normal Flat plate batteries

Maximum 3 years
 Needs frequent water topping up
 Low cyclic life
 Useful only at recommended temperature conditions.

Not recommended for heavy applications.

Simple design.

Affordable price.

Charges slowly compared to tubular batteries.

Recommended for small homes and budget-conscious people.

Reliable