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BATTERY DIRECTORY & YEAR BOOK



FORTNIGHTLY ISSUE
16-30 September 2026
(Vol.41, No.18 Published on 21.09.2026)

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page no. 10

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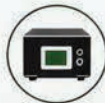
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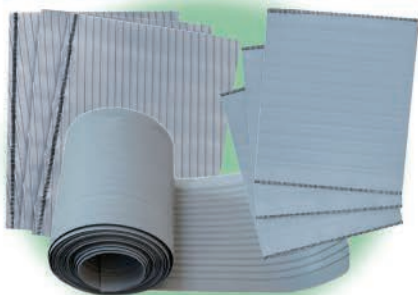


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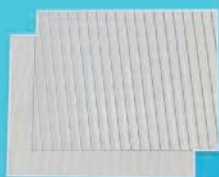
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Industrial/E-Rickshaw (More Power)

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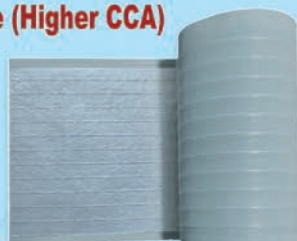


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LEAD-ACID BATTERY HELP LINE...

Why You Need Only LA-POWER Technologies?

'LA-POWER' Technologies provides not just only consultancy, it works as a complete project. So it is lengthy & consumes time to formulate effective solution that you have never seen before. It has a high class operational working system. Before it you know consultancy that a consultant visit out your factory & provides some tips & you have to do all arrangement & practical in his absence. So how you can satisfy?

The Lead-Acid Battery profession is totally different from others. Generally, to manufacture a product is a common work & to sale is difficult, but the Lead-acid battery profession is just inverse proportional to others. Here, to manufacture a best battery is really a challenging task & very few peoples are known better.

We are product & market player & play comprehensive role in lead-acid battery solution. So we are able to provide TQM practices.

It is a systematic magic that provides complete & reliable solution without much spending on men, machineries, money & materials. So, the saving in these resources is definitely first step of your profit and to reduce your battery claim up to aprox. nil is another major profit, which will boost your firm's goodwill along with extra income and off course your firm will be converted from a ordinary goodwill to a quality maker firm.

Yes! It is unbelievable, but 100% truth. Lot of business men are already benefited & enjoying battery profession as a complete professional. And off course you may be next one. It is extract of our more than two decades of vast R & D as "Battery & Indian Atmosphere". You may expect any thing & we promise you, we will fulfill your dreams.

Work Profile: Technical Consultancy in Lead-Acid Battery

Area of Consultancy

- Flooded (Conventional) Battery:
Antimonial/Selenium-Lead Ultra Low Maintenance 12V/2.5 to 12V/200 AH
- Valve Regulated Lead-Acid Battery (VRLA):
Calcium-Lead Based 100% Maintenance Free 1 AH to 1000 AH Battery

Type of Battery:

- Automobiles Batteries (Flooded & VRLA)
- Inverter/UPS Batteries (Flooded & VRLA)
- Tubular Batteries (Flooded)
- Solar Batteries (VRLA)
- Electrical Vehicle Batteries (Flooded & VRLA)
- Telecom/Railways Batteries (VRLA)
- Defence Batteries (Flooded)
- Industrial Batteries (Flooded & VRLA)

LA-POWER Differentials:

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- World class product
- One time solution & not need to continue the consultancy

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- Slow rate of power falling during life cycle
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VRLA battery means next generation battery & here, we have one & half decades of vast R & D experience. So a golden opportunity knocks to make your firm as a premier organization:

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If you are facing these following troubles, Yes! We Sure Help You!

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- **Plantation:**
 - a. Plantation/up-gradation of battery complete manufacturing unit
 - b. Physical, Chemical & Electrochem state-of-art Laboratory set-up
 - c. Plantation of pollution plant
- **Training:**
 - a. Complete know-how to mangt for qualitative production/controlling
 - b. Each section complete training for a lay-man to managers
 - c. Chemist training as step-by-step, A to Z section testing
 - d. Machineries/equipments handling, calibration & trouble shootings etc
- **Documentation:**
 - a. All types of Quality & Quantity formats for each section
 - b. Documentation for ISO certification
 - c. Charts/boards/indicators etc for best management system

ISO Certification

The concept of ISO certification provides two types of benefit as internal & external:

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- b. ISO 9001: 2015, for Quality Management System
- c. ISO 14001: 2015, for Environment Management System

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The secrets can change your professional way, it's extract of one & half decades of vast R & D:

- a. Project report
- b. Process control procedures
- c. Laboratory testing & specifications
- d. Format, indicators samples & Trouble shootings

Ravindra S Panwar

Battery Consultant (Technical & TQM)

LA-POWER CONSULTANCY SERVICES

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Knowledge without devotion to God produces hatred.

—Bhagwan Sh. Sathya Sai Baba



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510, Janta Flats, G.T.B. Enclave, Delhi-110093

Tel.: 011 - 22593952, Mobile : 9810268067

email : battdir@gmail.com

Website: www.batterydirectory.co.in

www.onlinebatterydirectory.com

Editor: Chandra Mohan

Assistant Editor:

Shekhar Verma

Sub-Editor: Ekta Verma

Editorial Advisers:

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Rajasthan Storage Battery Trade Association's

Monsoon Group Picnic Concludes Successfully

The Rajasthan Storage Battery Trade Association organized a mega gathering, picnic, and cultural evening on September 6 at the Silver Inn Resort & Banquet on Sikar Road. Approximately 600 battery traders from across the state participated in the event. Under the leadership of gathering committee conveners **Shri Ramesh Prajapat**,

Shri Rakesh Malani and **Janab Rafiq Mansuri**, activities such as Kabaddi, musical chairs, Housie, a lucky draw, and a cultural program were conducted. Several battery entrepreneurs also set up product stalls at the event. Founding member **Shri Satish Chandra Heda**, Patron **Shri Hansraj Agarwal**, President **Shri Satish Sharma**, General Secretary



*Seated in the front row are
Association President
Shri Satish Sharma,
Federation Central-West Zone
President Shri Kamal Kansal, and
Federation North Zone President
Shri Hansraj Agarwal.*

Winners were Awarded



Shri Lokesh Tikkiwal, Treasurer **Shri Surendra Sharma** and other office bearers emphasized business unity and mutual brotherhood.

The event was conducted by **Shri Poonamchand Kachhwah**. The main sponsor was **Redon Lithium Industries LLP**, Bengaluru. The

event sponsor was **Gravita India Ltd., Jaipur**. Co-sponsors included Jaipur-based **AVI Enterprises**, **Max Power Solution**, **Hari Om Battery**, **Rajdhani Trading Corporation**, **Sinewave Energy Saver Pvt. Ltd.** and **Prince Propcon (India) Pvt. Ltd.** □



A view of the program



50 Years of Power-7 Batteries in Jorhat

– Sajjan Kumar Mittal –
Chairman, S.K. Industries, Jorhat

My story begins in year 1971. After passing my matriculation exams, I traveled from Tinsukia to Jorhat by truck. My father was in the metal scrap business, so I, too, started working in the metal scrap trade upon arriving in Jorhat. I used to buy old iron, brass, and other metals. Then, **one day, I came across an old battery. Seeing it sparked a question in my mind: "What exactly is a battery?" That was the moment my journey with batteries began.**

Manual Battery Assembly

I cut open the battery to extract the plates, separating the lead from the powdered plate material. At that time, there was no battery industry in Jorhat, Assam. From 1971 to 1975, I continued extracting the lead and plate powder and selling them in Kolkata. In 1976, some local battery assemblers approached me and asked me to source plates for them. In those days, battery assembly was done manually; there were about 100 battery assemblers in Jorhat.

Manufacturing Battery Plates in 1982

Batteries for Ambassador cars and trucks were in high demand. I started sourcing branded plates from Kolkata to supply to the market. People would buy these plates to assemble their own batteries. In 1982, we began manufacturing battery plates right here in Jorhat. By 1984, I wondered why I shouldn't manufacture the batteries myself, so I started producing my own brand, 'Power-7'. I brought five people to Jorhat—including two battery technicians—and learned the battery manufacturing process alongside them.

Started Inverter Work in 1985

Back then, batteries were made using black hard-rubber containers. Initially, sales were just five batteries a month; this rose to 30 and eventually reached 40 batteries per month. That was when a new need emerged: inverters were not yet available in the market. In 1985, power outages were

frequent; people relied on generators, but starting and stopping them was a hassle. Around that time, inverters arrived in Assam, but people were unfamiliar with them. I installed inverters in the homes of five friends in Jorhat without charging a penny. I told them to use the devices for a month—if they liked them, they could keep them; otherwise, they could return them. Whenever the power went out, I would ride my scooter to those homes to check if the lights were still on. Seeing the lights glowing in a friend's house gave me immense joy; for me, that was the first realization that my venture was a success. After a month and a half, I asked if they wanted to keep the inverters. Four households decided to keep them, while one declined because they already owned a generator. That was just the beginning; it marked the start of my business in inverters and batteries.

In 1996, I began Manufacturing Tubular Batteries

Tubular Batteries did not exist back then. Flat-plate batteries had a short lifespan, requiring people to replace them every year or eighteen months. The challenge was finding a way to provide a longer-lasting battery; I traveled to Kolkata to seek expert advice on this issue. That is where I learned about tubular batteries. At the time, tubular batteries were primarily supplied to the Railways, and I was told they

could last five to six years. I decided to start manufacturing tubular batteries in 1996. Some local assemblers laughed at me, questioning whether tubular batteries would even work. I simply said, "Let's see." I launched the product with confidence, offering a two-year warranty. The batteries lasted five to six years, and people's trust in tubular batteries grew.



By the year 2000, heat-sealed batteries began appearing in the market, and customers started asking us for them as well. We realized that if the market was evolving, we had to evolve too. However, setting up a plant for heat-sealed batteries presented a financial challenge.

We informed our distributors that we would offer a special discount for advance payments. They supported us; with the advance funds, we imported a heat-sealed plant from abroad. Like other companies, we began operations using modern technology, and gradually, the business became established.

Standing Strong on Quality

However, this journey was not easy. Sourcing technical personnel and raw materials for batteries in the North-East was—and remains—a challenge. We confronted every obstacle and adapted to every change. Today, we stand tall in the North-East, driven by our commitment to quality. My

Cont. on page no.: 21 ➔



On 66th Birthday, Heartfelt Birthday Wishes to Shri Mulji Bhai Pansara

former President of the Federation of Indian Small Scale Battery Associations and the Gujarat Small Scale Battery Association.

Messages of good wishes received from across the country.

Those whose nature is as radiant as Gold.

Those whose hearts shine like the Stars.

Those whose dreams are as vast as the Sky.

One such individual gathered stars—both big and small—to create a vast constellation, and from this, **"Goldstar Power Limited"** was born.

Its founder is the pride of Vibhapar village and a cherished gem of the Pansara family: the respected, visionary, and confident elder, Shri Muljibhai Pansara. Wishing you a very happy birthday!

Through tireless hard work, dedication, and integrity, he established the Goldstar empire. Today, it has expanded like a massive banyan tree, with branches reaching across India and abroad. The love of this humble, gentle, and dutiful father constantly showers upon his son, daughter, daughter-in-law, grandchildren, family, and friends; his boundless affection and watchful, caring gaze are always

upon his children. Yet, when his children occasionally lose their way—intoxicated by rapid success—he knows exactly how to guide them back to the right path, much like Lord Shiva opening his third eye. **It is fitting that the entire village regards the forgiving Muljibhai as "Mahadev."** Throughout the ups and downs of life—and amidst social, economic, and business challenges—he has often "consumed the poison" (endured hardships) like Shiva, while keeping the family united like beads on a single thread. This exemplifies the unity of the "Star family."

Today, the responsibility of this vast empire rests in the capable hands of Navneet and Vishal, alongside Shivam. As Managing Director, Navneet has achieved great success and renown at a young age, while Vishal has managed the entire Uganda operation with immense hard work and dedication. Shivam, too, has learned lessons in maturity from his father and uncle; working hand-in-hand with his elder brother Navneet, he has become

fully capable of managing company operations both in India and overseas. Thus, under the guidance of Amrit Kaka and their father, Navneet, Vishal, and Shivam are steering 'Star Samrajya' towards 'Star World.' Moreover, by according an equal position to his daughter-in-law alongside his sons within the company, he has provided her with the opportunity to hone her talents. He has empowered Dhruvi to learn the nuances of the business and work shoulder-to-shoulder with everyone, thereby proving that sons and daughters are equal. Indeed, the women of the family contribute equally to the success of Goldstar.

The Star family knows not only how to earn wealth but also how to

help the needy and society when the occasion arises. Through this, they convey the message that ceaseless action is true righteousness and hard work is the key to success. I feel proud to write a few words about such enterprising individuals who remain deeply connected to their roots. It is my wish that "Goldstar Power Limited" scales new heights and brings glory to the village, both at home and abroad.

Today, on Muljibhai's birthday, I pray that Lord Mahadev grants him a long and healthy life and that he spends his remaining years with honor and dignity.

– **Surbhi Patel**

Mahadev Har... Jai Shri Krishna.

Best Wishes Messages

Mulji Bhai Stay blessed. Many happy returns of the day.

– **Harashpal Singh Sawhney**, *Harsha Industries Corporation, Delhi*

Peace, and many more wonderful years ahead. Have a truly blessed and beautiful birthday!

– **Ravi K. Govindan**, *Microtex Energy (P) Ltd., Bengaluru*

Mulji bhai stay blessed always.

– **Ajay Gupta**, *A.K. Auto Agency (P) Ltd., Mumbai*

May God bless you with good health, happiness,

– **Hans Raj Agarwal**, *Hi Tech Insulators Pvt. Ltd., Jaipur*

Mulji bhai wish you a very happy birthday God bless you.

– **Madan Lal**, *Hyderabad Battery Association, Hyderabad*

Happy birthday Sahabh ji, Wishing you a very Happy Birthday Mulji Bhai.

– **Ravi Nakra**, *Nakra Sales, Kota*

आदरणीय श्री मूल जी पंसारा साहब को जन्म दिवस की हार्दिक बधाई एवं शुभकामनाएँ.

– **Poonam Chand Kachhawa**, *Balaji Storage Batteries Ltd., Paonta Sahib*

Many Many Happy Returns of the day MULJI BHAI. Happy Birthday.

– **Dr. Dhanyesh Namdeo Lohokare**, *Indo Automotive Batt. Pvt. Ltd., Pune*

From Lead-Acid to Lithium: Evolving Battery Technology Options and the Major Challenge of Safety

Lead-Acid Batteries Remain Significant in the Market

In the current market, Lead-Acid Batteries remain highly competitive in terms of price. Depending on capacity and model, the price of larger batteries ranges from approximately ₹7,000 to ₹12,000. With proper use and maintenance, a standard lead-acid battery can last for about 4–5 years. This is why many customers still prefer traditional batteries.

High Scrap Value of Lead-Acid Batteries

Additionally, a significant economic advantage of lead-acid batteries is their scrap value. When replacing an old battery, the amount recovered from its scrap reduces the effective cost of the new battery to some extent. In contrast, scrap lithium batteries are sold at rates comparable to scrap iron.

Rising Demand for Lithium Batteries

On the other hand, the demand for lithium batteries is also increasing in the market. Inquiries regarding lithium batteries have risen not only in Delhi but also in the NCR and other regions. Some major battery brands have started including lithium batteries in their product portfolios. One reason for this is changing customer preferences; if a customer specifically asks for a lithium

battery, sellers are compelled to make them available.

Lithium batteries with capacities of up to approximately 100 Ah are becoming readily available. A 100 Ah lithium battery from a reputable brand costs around ₹19,000–₹20,000, whereas some lead-acid battery options are available at significantly lower prices.

This makes it clear that when purchasing a lithium battery, one should consider not just the initial price but also the total cost over the battery's lifespan.

Space Efficiency and Low Maintenance: Key Advantages of Lithium

A significant advantage of lithium batteries is their compact size. For instance, a setup of approximately 5 kW requires a system of four batteries. Since customers often have limited space, the lithium battery setup can be installed inside a counter within an area of approximately 2×2 feet. This compact design is particularly valuable in locations where there is insufficient space to house batteries.

Additionally, unlike traditional flooded lead-acid batteries, lithium batteries do not require regular water top-ups—though sealed, maintenance-

free batteries that eliminate the need for watering are also available.

The Crucial Safety Mechanism of BMS in Lithium Batteries

A key similarity between lithium batteries and mobile phone batteries is that both utilize electronic safety systems to regulate charging.

The BMS (Battery Management System) plays a vital role in lithium battery packs. It performs various functions related to monitoring and protecting the battery cells. If the charging system attempts to overcharge the battery, the BMS can halt the charging process to ensure safety.

When purchasing a lithium battery, looking solely at the Ah capacity or price is insufficient. Factors such as cell quality, the BMS, battery design, the charging system, and the manufacturer's reliability are equally important.

Safety: The Paramount Concern

With the increasing use of lithium batteries, safety has become a major topic of discussion. Lithium battery packs consist of a large number of interconnected cells. A serious

malfunction in a cell or the battery pack can lead to risks such as overheating, short-circuits, or fires. Controlling fires resulting from such incidents is often nearly impossible.

New Challenges Posed by Local and Refurbished Batteries

Another market concern involves the availability of local and second-hand batteries. Some vendors refurbish old batteries and sell them as new, often offering only a limited-term warranty. Similarly, there are concerns that used cells are being repackaged and sold as new battery packs in some markets.

The major issue with such products is that it can be difficult for the customer to determine exactly which cells have been used, their actual capacity, and the quality of the BMS and other safety systems. Therefore, purchasing a battery based solely on its outer packaging or an attractive label is not advisable.

The Growing Trend of Assembling Battery Packs from Purchased Cells

Another shift in the market is that many companies and small-scale manufacturers are sourcing cells from

Lithium battery packs consist of a large number of interconnected cells. If a serious fault occurs in a cell or the battery pack, it can lead to risks such as overheating, short-circuits, or fire. Controlling a fire in such situations is nearly impossible.

The Point



various suppliers and assembling them to create battery packs. Constructing such a battery pack is not inherently wrong; however, its quality depends entirely on the cells used, the pack design, the BMS (Battery Management System), welding, wiring, thermal management, testing, and quality control.

Shifts in the E-Rickshaw and EV Sectors

This transformation in battery technology is not limited to home inverter systems alone. A shift from traditional battery setups to lithium batteries is also being observed in the electric vehicle (EV) sector, particularly in e-rickshaws.

Previously, many electric scooters or e-rickshaws utilized multiple smaller batteries. Now, some systems employ a single, large lithium battery pack.

This enables changes regarding weight, space, maintenance, and design. However, this also makes the quality of the battery pack, the charging system, and service support increasingly critical.

Service Network: A Key Factor in Purchasing Decisions

One of the major practical challenges associated with

lithium batteries is the service and repair network. If adequate service facilities for a specific brand are unavailable in the customer's area and a technical issue arises, the customer may be forced to rely entirely on the company or its authorized service team.

In such scenarios, servicing could take a day or two—or even longer. Therefore, when purchasing a lithium battery, it is not enough to simply consider the warranty period; one must also verify who will provide actual service during the warranty term and how easily technical support is available locally.

Price Comparisons Should Go Beyond Initial Purchase Cost

For instance, if a 150 Ah lead-acid battery costs approximately ₹12,000 and a lithium battery costs around ₹20,000, there appears to be a difference of about ₹8,000 in the initial purchase price. However, the following factors should also be considered when making a realistic comparison:

- ✓ Expected battery lifespan
- ✓ Frequency of battery replacement
- ✓ Maintenance costs
- ✓ Power consumption and efficiency
- ✓ Battery warranty

The Point



When purchasing a lithium battery, it is not enough to simply check the warranty period. It is also important to consider who will provide the actual service during the warranty period and how easily technical support is available locally.

Lead-acid batteries remain significant due to their low initial cost, safety, long-established technology, and superior scrap value.

- ✓ Service and repair costs
- ✓ Scrap value of the old product
- ✓ Installation and charging system costs
- ✓ Safety and quality

Therefore, it may be more beneficial for the customer to compare options based on the Total Cost of Ownership (TCO).

No immediate need to switch technology if the old battery is functioning well

A practical perspective suggests that if the existing lead-acid battery is currently working properly, replacing it immediately simply because a new technology is available is not advisable.

If the existing battery performs well within its useful life, it can continue to be used until the end of its lifespan. During this period, there may be changes in the price, technology, and service network associated with lithium batteries.

Lead-acid batteries remain significant due to their low initial cost, safety, long-established technology, and better scrap value; meanwhile, lithium batteries are attracting new customers with features such as compact size, minimal routine maintenance, and modern BMS-based management.

However, the choice between the two technologies should not be based solely on price or the allure of new technology.

It is essential to consider all aspects: battery age, usage pattern, load, backup requirements, space constraints, maintenance, service network, safety, and manufacturer reliability.

Especially in the case of lithium batteries, prioritizing high-quality cells, a reliable BMS, a suitable charger/inverter, proper installation, and authorized service support is crucial. □

50 Years of Power-7 Batteries...

Cont. from page no.: 15 →

conviction remains unchanged: our batteries must offer excellent longevity. To me, a battery is not merely a product; it represents 50 years of hard work, learning, struggle, and trust. It all began in 1971 with a simple question sparked by the sight of an old battery: "What exactly is this?" That very question set me on this path. Today, my hope is that you continue to receive batteries you can rely on. This is not just a journey of battery manufacturing; it is a journey built on 50 years of trust.

We are now established manufacturers and suppliers of a wide range of lead-acid storage batteries. Our mission is to meet the challenges posed by the growing demand for innovative and dynamic products across various applications in India. Our facility manufactures heat-sealed tubular, automotive, solar, and low-maintenance batteries.

Our manufacturing unit, S.K. Industries, is located at the Industrial Estate, Cinmora, Jorhat-785006, Assam, and our office is situated at Power-7 Battery House, Fancy Ali, Jorhat-785001, Assam. □



Responsible Sourcing of Refined Lead

From Informal Collection to a Transparent, Traceable & Responsible Circular Lead Economy

– Dr. Suresh Kapiti, Entrepreneur

Kapiti Overseas Pvt. Ltd., Hyderabad, Mobile No. 9701029731

India's lead story is no longer only about mining. It is increasingly about what happens after a battery reaches the end of its useful life.

Every used lead-acid battery contains valuable lead. But between the moment a battery becomes waste and the moment refined lead re-enters the industrial economy, there can be a long and complex chain:

Consumer → Collection → Aggregator → Dismantling → Battery Breaking → Smelting → Refining → Alloying → Manufacturer → New Battery

The question for India's next generation of lead businesses is therefore not simply:

“How much lead can we recover?”

The more important question is:

“Can we prove where the lead came from, how it was recovered, how it was processed, and whether the entire chain was responsible?”

That is the essence of Responsible Sourcing of Refined Lead.

1. India's Lead Economy: a Circular Opportunity

Lead is unusual among industrial metals because it can be repeatedly recovered and returned to productive

use.

A used lead-acid battery is not merely waste. It is a secondary raw-material resource. Its lead can move through a circular loop:

USED BATTERY → COLLECTION → SEGREGATION & SAFE HANDLING → BATTERY RECYCLING → LEAD RECOVERY → SMELTING → REFINING → HIGH-PURITY / REFINED LEAD → BATTERY & INDUSTRIAL APPLICATIONS → END OF LIFE → BACK TO RECYCLING

This is the fundamental principle of the circular lead economy.

India's Battery Waste Management Rules, 2022 explicitly recognise recycling of battery materials including lead, nickel, lithium, cobalt, plastics, rubber and glass, and establish Extended Producer Responsibility for batteries.

2. But Circular Does Not Automatically Mean Responsible

This distinction is critical. A material can be recycled without the supply chain necessarily being responsible.

For example:

Battery collected → Recycled → Lead Produced

may look circular.

But a responsible supply chain asks much deeper questions:

- ◆ Where did the battery originate?
- ◆ Was it legally collected?
- ◆ Who owned it?
- ◆ Was the material diverted from an authorised channel?
- ◆ Was the recycler appropriately authorised?
- ◆ Was the battery processed safely?
- ◆ Were workers adequately protected?
- ◆ Were emissions controlled?
- ◆ Were residues properly managed?
- ◆ Were taxes and statutory obligations complied with?
- ◆ Can the material be traced?
- ◆ Is the transaction financially transparent?
- ◆ Can the buyer demonstrate the provenance of the refined lead?

This is where responsible sourcing begins.

3. The Real Challenge: The First Mile

The greatest weakness in many recycling supply chains is not necessarily the refinery.

It is the first mile. Imagine a used automotive battery leaving a workshop in Hyderabad.

It may travel through:

Workshop → Local collector →
Small trader → Regional aggregator
→ Battery dismantler → Recycler →

Smelter → Refiner

At every step, information can disappear. By the time refined lead reaches the market, the final buyer may know its chemical composition, but not necessarily its complete provenance.

That creates a fundamental distinction: Material Traceability, What is this metal? versus Supply-Chain Traceability, Where did this metal come from? A mature lead industry needs both.

4. India Needs A “Lead Passport”

One powerful solution is to create a Lead Passport for every significant batch of refined lead.

Think of it as the identity card of the metal.

LEAD PASSPORT

Batch ID: RL-2026-XXXX

Origin of feedstock: India

State: _____

District: _____

Supplier: _____

*Material: Used Lead-Acid Battery
/ Lead Scrap*

Collection date: _____

Input quantity: _____ MT

Recycler: _____

Authorisation: _____

Processing date: _____

Recovered lead: _____ MT

Recovery rate: _____ %

Refining: _____

Assay: _____ % Pb

Impurities: _____

Waste/residue management:

EPR linkage: _____

Final customer: _____

The objective is simple: Every tonne of refined lead should have a story. And that story should be verifiable.

5. From “Cheapest Lead” To “Trusted Lead”

For decades, commodity markets have often been dominated by one question: What is your price?

The future will increasingly add another: Can you prove your supply chain?

This changes the competitive landscape. There may be two tonnes of refined lead with identical laboratory specifications.

Both contain 99.97% lead.

But one has:

- ✓ Documented origin,
- ✓ Verified supplier,
- ✓ Legal collection,
- ✓ Traceable processing,
- ✓ Environmental compliance,
- ✓ Worker-safety records,
- ✓ Documented transactions,
- ✓ Batch-level traceability.

The other does not.

Chemically, they may look similar. Commercially, they are not necessarily equivalent. This is the emergence of “Trusted Metal.”

For decades, commodity markets have often been dominated by one question: What is your price?

The future will increasingly add another:
Can you prove your supply chain?

6. Responsible Sourcing = 5 Layers Of Due Diligence

A strong Indian responsible-lead framework should examine at least five dimensions.

1. LEGAL DUE DILIGENCE

Ask:

Is the material legally sourced?

Verify:

- ◆ supplier identity
- ◆ GST/PAN and business registration
- ◆ Purchase documentation
- ◆ Ownership of material
- ◆ Transport records
- ◆ Statutory authorisations
- ◆ Applicable environmental permissions
- ◆ Transaction records

2. ENVIRONMENTAL DUE DILIGENCE

Lead recycling is an environmentally sensitive activity. Therefore responsible sourcing cannot stop at the purchase invoice. It must ask:

What happened to the lead-bearing material during processing?

Important areas include:

- ◆ Emissions
- ◆ Effluent
- ◆ Dust
- ◆ Fumes

- ◆ Lead-bearing residues
- ◆ Slag/ash
- ◆ Soil contamination
- ◆ Groundwater protection
- ◆ Waste disposal
- ◆ Worker exposure

CPCB guidance for lead-scrap recycling specifically addresses environmental monitoring and operational requirements, including emissions, wastewater, ambient air, work-zone environment, soil and groundwater considerations.

3. SOCIAL DUE DILIGENCE

The human dimension is equally important. A responsible supply chain should seek to prevent:

- ◆ Child labour
- ◆ Forced labour
- ◆ Unsafe working conditions
- ◆ Uncontrolled exposure to lead
- ◆ Exploitation of informal workers
- ◆ Inadequate PPE
- ◆ Poor occupational hygiene

Responsible sourcing therefore becomes:

Metal + People + Planet
not merely metal procurement.

4. FINANCIAL & INTEGRITY DUE DILIGENCE

This is often overlooked. A responsible metal company should understand:

- ◆ Who are we paying?
- ◆ Why are we paying them?
- ◆ Where did they obtain the material?
- ◆ Is the transaction properly

documented?

- ◆ Does the quantity purchased make economic and physical sense?
- ◆ The financial trail should reconcile with the physical trail.

Physical Flow

100 MT battery scrap → X MT recovered lead → Y MT refined lead

Financial Flow

Purchase invoice → Bank payment
→ Processing cost → Sales invoice → Customer receipt

When physical and financial records do not reconcile, the supply chain deserves deeper investigation.

7. Traceability Is The New Infrastructure

The future responsible-lead ecosystem could operate on a simple principle: No undocumented material should enter a high-trust supply chain.

Technology can make this practical.

Digital Traceability Architecture

Supplier Registration → Material Identification → GPS / Transport Record → Digital Weighment → Batch Number → Processing Record → Laboratory Assay → Refining Record → Finished Lead Batch → Customer → Digital Certificate

This does not necessarily require complicated blockchain architecture.

Even a disciplined combination of:

ERP + QR coding + digital weighment + supplier KYC + laboratory records + document management

Can dramatically improve transparency.

Continued in Next English Issue

Benefits of Advertising in Battery Directory

If you advertise in the Battery Directory, you will receive the following benefits:-

✓ **Your product will be promoted among battery entrepreneurs from India and abroad.**

✓ **You will receive a free set of the Battery Directory-2026 (priced at Rs. 650).**

✓ **The Online Battery Directory-2026 subscription fee is Rs. 1000, and this subscription will be provided free of charge. Not only you but also your staff will be able to view and benefit from the directory on their mobile phones, laptops, or computers.**

✓ **Your name will be highlighted in the Product Manufacturing Index.**

✓ **Your mobile number will be added to the Battery Directory WhatsApp group, allowing you to connect directly with battery entrepreneurs across the country and meet your needs within the group.**

✓ **You will receive free access to the Battery Directory's fortnightly issues throughout the year.**

✓ **You can submit articles and news for publication in the magazine.**

✓ **Your photo may be published in the Battery Directory under the "Batterymen at a Glance" column.**

✓ **Your address will be printed in the Battery Directory with your brand name logo, which will draw attention to your address.**

✓ **In the Online Battery Directory, you can easily access the details and advertisements of the people you want to find in a few moments using the search tool. This way, other people can also reach you. This easy access increases business.**

✓ **Your advertisement will appear under your city in the Online Battery Directory portal www.onlinebatterydirectory.com.**

✓ **Your company name will appear under your state and city in the online battery directory portal www.onlinebatterydirectory.com.**

The fee for a one-page color advertisement (including 5% GST) is ₹9,450.

The fee for a half-page color advertisement (including 5% GST) is ₹5,250.

The fee for a one-page color advertisement (including 5% GST) is ₹5,250.

Chandra Mohan: 9810268067

Demand for 5% GST on Containerized Battery Energy Storage Systems

Renewable energy developers have urged the government to reduce the Goods and Services Tax (GST) on standalone utility-scale or container-based Battery Energy Storage Systems (BESS) from 18% to 5%. This demand aims to align the tax rate with that of equipment used in renewable energy projects—such as solar modules—and to accelerate their adoption.

In a written memorandum submitted to the Ministry of New and Renewable Energy, the National Solar Energy Federation of India stated that the high GST rate is making such projects less competitive. This appeal comes amidst growing concerns regarding the curtailment of green energy during solar power generation—an issue that could be mitigated through the integration of energy storage.

According to industry sources, the Federation noted in its letter that a reduction in GST on BESS could lead to savings of approximately ₹0.25–0.41 per unit in the Levelized Cost of Storage (LCOS).

The memorandum argues that BESS should be classified as a 'generation asset'—similar to solar modules and wind turbines—and that a 5% GST rate should apply to BESS containers, including the battery cells within them.

Typically, battery containers account for about 85–90% of the total cost of a BESS system. Such a move would allow BESS projects to be treated as 'composite contracts'—akin to solar and wind power projects—thereby simplifying implementation and enhancing commercial viability.

The Central Electricity Authority has projected a requirement for 411.4 GWh of energy storage capacity by 2032, comprising 175.18 GWh from pumped-storage projects and 236.22 GWh from BESS. The letter states that, given the potential for large-scale implementation, the reduction in storage costs (levelized cost) could yield an estimated 'Net Present Value' benefit of approximately ₹24,000 crore; this amount exceeds the estimated GST revenue loss of around ₹20,000 crore. 

Before you speak, ask yourself: Is it kind, is it necessary, is it true, does it improve the silence?

– Bhagwan Shri Sathya Sai Baba



Rajasthan Leads in Decentralized Solar Capacity under PM-KUSUM

Ranks Third in Standalone Solar Pumps

According to information provided in the Lok Sabha, Rajasthan has emerged as the leading state in the country for installing decentralized solar power plants under the Central Government's flagship PM-KUSUM scheme and ranks third in the installation of standalone solar pumps.

Responding to questions raised by **Sh. Rahul Kaswan (MP from Churu, Rajasthan)**, **Sh. Brijendra Singh Ola (MP from Jhunjhunu)** and **Sh. Shripad Yesso Naik (Minister of State for New and Renewable Energy)** stated that Rajasthan is among the leading states in implementing the **Pradhan Mantri-Kisan Urja Suraksha evam Utthaan Mahabhiyan (PM-KUSUM)**, driven by active state participation and increased farmer awareness.

Under 'Component A'—which facilitates the installation of decentralized solar power plants of up to 2 MW capacity on farmers' land—Rajasthan has commissioned over 1,236 MW of capacity since 2021-22, the highest in the country. In the first quarter of 2026-27 alone, the state added 500.09 MW of capacity, accounting for approximately 74% of the 673.97 MW capacity installed nationwide during that period.

The state has also emerged as a top performer under 'Component B', having installed 127,639 standalone solar pumps between 2020-21 and June 2026. Rajasthan trails only Maharashtra (551,971 pumps) and Haryana (194,969) in this regard, while Uttar Pradesh and Jharkhand are among the top five states. Nationally, 11.49 lakh standalone solar pumps have been installed under this scheme.





Electric Scooter Turns into Fireball After Battery Explosion Two Children Narrowly Escape

On August 24, a fierce fire broke out in Suratgarh near the Baba Ramdev Temple after the battery of an electric scooter suddenly exploded with great force. A boy riding the scooter saved his life by jumping off just in time, while another child nearby reacted quickly to move to a safe distance. Within moments, the fire engulfed the entire scooter, reducing the vehicle to ashes. CCTV footage of the incident has also surfaced.

The incident has raised questions regarding the safety of electric vehicle batteries and the precautions that should be taken during charging. ☐

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Electric Scooter Battery Explodes

Fire Breaks Out in House

Around 3:30 AM on September 3, the battery of an electric scooter exploded with a loud noise in the Harijan Colony, located on the Babri-Hiranwara road in Shamli. The explosion immediately sparked a fire in the house. At the time of the incident, Umesh—the son of the homeowner, Surendra Kumar—was asleep in the room.

Umesh woke up suddenly as the room filled with smoke. He was shocked to see flames right in front of him. He managed to escape the room and save his life.

Alerted by the commotion, neighbors rushed to the scene and began trying to extinguish the fire. Within moments, the flames engulfed the belongings kept in the room. The fire spread so rapidly that the family did not have a chance to move their possessions to safety.

In addition to the electric scooter, items such as bedding, tables, chairs, a mixer-grinder, a mobile phone, and a fan—along with other household goods—were reduced to ashes. According to the family, the fire caused a loss of approximately ₹1.5 lakh.

The incident has left the family in a state of fear. The fire caused by the electric scooter battery explosion has also raised concerns among the local residents. □



E-rickshaw Battery Explodes While Charging

Two die in warehouse fire

A fire broke out in a warehouse in the Raghbir Nagar area of West Delhi on the morning of August 17 following a suspected battery explosion. Two people, including a 17-year-old boy, lost their lives in the incident. According to the police, the deceased have been identified as 17-year-old Mohammad Sufed—a native of Bhagalpur, Bihar—and his 38-year-old maternal uncle, Ahmed. The fire started while they were charging e-rickshaw batteries.

The Delhi Fire Service received a call about the fire at 4:42 AM. The blaze had broken out on the first floor of a five-story building in Raghbir Nagar. Reports indicate that the suspected battery explosion ignited household items stored in the premises. Firefighters managed to bring the blaze under control after a strenuous effort. According to the police, a team arrived at the scene after receiving a PCR call. They rushed Sufed and Ahmed to Guru Gobind Singh Hospital, where doctors declared both of them dead. □

There is only one language, the language of the
Heart. There is only one religion, the religion of Love.

– Bhagwan Shri Sathya Sai Baba



Over 2,000 Fires Caused by E-Scooters or their Batteries

A 'Freedom of Information' request by BBC Verify reveals that more than 2,000 fires in the UK between 2019 and 2025 were caused by e-bikes, e-scooters, or their batteries. Data shows that the number of such incidents is rising annually, with approximately half of the fires occurring in homes or garages.

According to the London Fire Brigade, many of these fire incidents involved second-hand vehicles or bikes that had been modified using parts purchased online.

Footage of fires involving e-bikes and e-scooters demonstrates how quickly these vehicles can emit smoke and subsequently explode, causing the fire to spread within minutes.

Fatalities recorded by UK fire and rescue services in connection with these fires include cases where individuals were trapped inside burning homes, died while attempting to escape the flames through high-level windows, or succumbed to toxic smoke inhalation. ❏



We should get satisfaction from our work. This is most important.

– Bhagwan Shri Sathya Sai Baba

LICO to Recover Graphite from Old EV Batteries

LICO Materials has developed a process to recover graphite from end-of-life lithium-ion batteries and battery manufacturing scrap. According to the company, it is the first in India to recover graphite from used batteries and cell manufacturing scrap for supply to Epsilon



Advanced Materials (EAM). The recovered graphite will serve as a secondary feedstock for graphite anode material.

Graphite accounts for approximately 20–30% of a lithium-ion battery's weight and is a key material for the battery's anode. Currently, China holds a share of over 90% in global graphite refining, nearly 80% in mining, and over 90% in anode active material production. According to the International Energy Agency, China's share of the global supply of battery-grade graphite could remain around 80% in 2035.

Demand for graphite is expected to rise alongside the growth of domestic battery manufacturing in India. Data cited by the Ministry of Heavy Industries indicates that the demand for lithium-ion batteries in India could reach 210 GWh by 2030. This will require an estimated 200,000 to 230,000 tonnes of graphite anode material annually. In this context, recovering graphite from old batteries and manufacturing scrap could provide an additional source for domestic supply.

LICO will recover graphite using its critical mineral recovery process and subsequently supply it to EAM. EAM will process and qualify the recovered graphite for use as a secondary feedstock in its graphite anode material platform. According to the companies, samples are expected to be made available for customer validation by the end of 2026, following internal development and testing.



Good company is important,
it helps to cultivate good qualities.

India's battery industry to generate 2 million jobs by FY2030

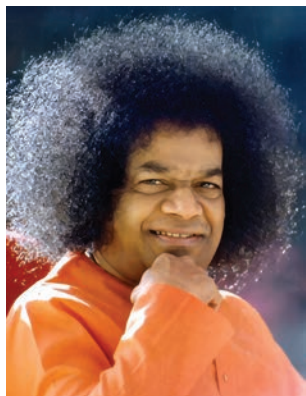
Adecco India states that the country's battery industry could generate 1.5 to 2 million jobs by 2029-30. The industry is entering a phase of significant capital investment and employment generation, transforming from a sector reliant on assembly and imports into a fully integrated "cell-to-recycling" industrial ecosystem.

According to Shri Dipesh Gupta, Director and Head of General Staffing at the company, India's battery industry is moving beyond the mere import and assembly of lithium-ion cells toward domestic battery manufacturing; this encompasses the entire value chain, from cell and battery pack production to recycling.

Adecco India notes that the industry will prioritize hiring skilled professionals in fields such as electrochemistry, materials science, battery engineering, manufacturing, and recycling.

It is projected that by 2030, lithium battery manufacturing will account for 50–60 percent of all green manufacturing jobs in India. Professionals with specialized skills in battery engineering could command salaries 35–40 percent higher than those in traditional manufacturing and electronics roles.

Battery manufacturing in India is scaling up to plant-level capacities. Under the Production Linked Incentive (PLI) scheme for Advanced Chemistry Cells (ACC), the government has committed ₹18,100 crore to develop a domestic ACC manufacturing capacity of 50 GWh, with an additional 5 GWh capacity allocated for niche chemistries. □



Life is a song - sing it.
Life is a game - play it.
Life is a challenge - meet it.
Life is a dream - realize it.
Life is a sacrifice - offer it.
...Life is love - enjoy it.

– Bhagwan Shri Sathya Sai Baba



TUBULAR PLATE

Tubular Battery Plate

In order to help and develop the country's lead battery entrepreneurs, Microtex Energy Pvt. Ltd., Bangalore's website microtexindia.com has posted several blogs on battery and battery related topics. We are publishing one of these here.

In the production of lead-acid battery, a variety of positive electrodes (or as commonly called, "plates") is employed:

They are:

- a. Flat plate or grid plate or pasted plate or lattice-type or Fauré plate (1.3 to 4.0 mm thickness)
- b. Tubular plates (inner diameter ~ 4.9 to 7.5 mm)
- c. Planté plates (6 to 10 mm)
- d. Conical plates
- e. Jelly roll plates (0.6 to 0.9 mm)
- f. Bipolar plates

Of these the first-mentioned flat-plate type is the most widely used; though it can supply heavy currents for a short duration (for example, starting an automobile or a DG set), it has a shorter life. Here, a lattice type of rectangular

current collector is filled with a paste made from a mixture of leady-oxide, water and sulphuric acid, carefully dried and formed. Both positive and negative plates are made in the same manner, except for the difference in additives. Being thin, batteries made from such plates can supply very high currents needed for starting an automobile. The life expectancy is 4 to 5 years in such an application. Before the advent of the alternator-rectifier arrangement, the life was shorter.

Tubular plates: The next widely used type of plate is the tubular plate which has a longer life, but cannot supply a burst of current as in the flat plate type of batteries. We discuss the tubular plates in detail below.

Planté Plate: For a long life with the most stringent reliability requirement in places like power stations and

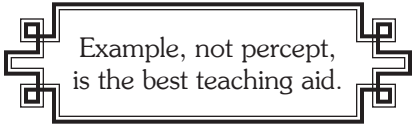
telephone exchanges, the type of lead-acid cell preferred is the Planté type. The starting material for the tubular plate is about 6-10 mm thick casting of high purity lead sheets with numerous thin vertical laminations. The basic surface area of the tubular plate is vastly enhanced by the lamellar construction, which results in an effective surface area which is 12 times that of its geometric area.

Conical Plate: It is lattice-type circular-shaped pure lead grids (cupped at a 10° angle), plates stacked horizontally one above the other and made from pure lead. This was developed by Bell Telephone Laboratories, USA.

Jelly Roll Plates: They are thin continuous grid plates made from a low-lead tin alloy of 0.6 to 0.9 mm thickness facilitating high rates. The plates are pasted with lead oxides, separated by an absorbing glass mat, and spirally wound to form the basic cell element.

Bipolar plates: These plates have a central conducting sheet made either from metal or conducting polymer and having positive active material on one side and negative material on the other side. Such plates are stacked in such a manner that opposite polarity active materials face each other with a separator in between them., to obtain the required voltage.

Here separate inter-cell connection is eliminated, thereby reducing the internal resistance. It may be noted that the extreme plates in a bipolar battery are always of the mono-polar type, either positive or negative.



Example, not percept,
is the best teaching aid.

Differences - Tubular battery vs flat plate battery

Flat plate batteries are meant for high current, short duration discharge as in the automobile and DG set starting batteries. They usually have a life of 4 to 5 years and the end of life is mainly due to the corrosion of the positive grids, resulting in the loss of contact between the grid and active materials and subsequent shedding.

Which is better tubular or flat plate battery?

Tubular plates are robust and hence have a life of about 10 to 15 years in float operation. They are also suitable for cyclic duty and offer the highest cycle life. The active material is contained in the annular space between the spine and the oxide-holder. This restricts the stress due to the volume changes occurring when the cells are cycled.

The end of life is again due to the corrosion of the spines and loss of contact between the spines and the active material. However, the contact area between the spine and the active mass is reduced in such a construction and hence under heavy current drains, the higher current density results in local heating leading to rupture of tubes and crack in the corrosion layer.

Planté plate cells have the longest lifetime, but the capacity is poor compared with other types. But these cells offer the highest reliability and longest float lives. Their cost is also higher, but if it is estimated over the lifetime it is actually lower in comparison with other stationary type cells. The reason for longer life is that the positive plate surface is

continuously regenerated with virtually no loss in capacity over its lifetime.

Conical plate cells are specially designed by Lucent Technologies (formerly AT&T Bell Laboratories) for a very long life of more than 30 years. Recent 23-year corrosion data projects a life of 68 to 69 years for such batteries.

The jelly roll design lends itself to mass production due to excellent mechanical and electrical characteristics. Jelly-roll construction (spirally-wound electrodes) in a cylindrical container can maintain higher internal pressures without deformation and can be designed to have a higher release pressure than the prismatic cells. This is due to an outer metal container used to prevent deformation of the plastic cases at higher temperatures and internal cell pressures. The range of venting pressures may be as high as 170 kPa to 275 kPa (25 to 40 psi » 1.7 to 2.75 bar) for a metal-sheathed, spirally wound cell to of 7 kPa to 14 kPa (1 to 2 psi » 0.07 to 0.14 bar) for a large prismatic battery.

Bipolar Plate Batteries

In the design of a bipolar plate, there is a central electronically conducting material (either a metal sheet or a conducting polymer sheet) on one side of which is positive active material and the other, a negative active material. Here separate inter-cell connection is eliminated, thereby reducing the internal resistance. It is to be noted that the extreme plates in a bipolar end cells are always of the mono-polar type, either positive or negative.

These batteries have:-

1. Higher specific energy and higher energy density (i.e., 40% less volume or 60% the size of a regular lead-acid battery, 30% less weight or 70% the mass of regular lead-acid batteries.
2. Double the cycle life
3. Half as much lead is needed and other materials are also reduced.

Why tubular battery?

Tubular plate batteries are used mainly where there is a requirement of a long life with higher capacity. They are mainly used in standby applications in telephone exchanges and large factories for material handling trucks, tractors, mining vehicles, and, to some extent, golf carts.

Nowadays, these batteries are ubiquitously found in every household for inverter-UPS applications.

Extra tall type plates (as tall as 1 metre and more) are employed in submarine batteries to provide power when the submarine is submerged. It provides silent power. The capacities vary from 5,000 to 22,000 Ah. The

Tube Diameter (mm)	7.5	6.1	4.9
Electrolyte Density (Kg/Litre)	1.280	1.300	1.320
Number of spines	19	24	30
Tubular plate pitch	15.9	13.5	11.4
Spine thickness	3.2	2.3	1.85
Specific energy (Wh per kg) at 5 hour rate	28	36	40
Cycle life	1500	1000	800

Reference: K. D. Merz, J. Power Sources, 73 (1998) 146-151.

submarine cells have air-pumps inserted into them to nullify the acid stratification of electrolyte for 1 to 1.4 m tall cells.

Gelled electrolyte tubular plate valve-regulated lead-acid batteries are extensively used in non-renewable energy systems like solar applications.

Thin tubular plate EV batteries for vans and buses find applications in EV field and are able to deliver 800 to 1500 cycles depending on the spine thickness and specific energy.

The following table illustrates the relationship among the spine thickness, plate pitch, electrolyte density, specific energy and number of life cycles.

How to make tubular battery plate?

Tubular Bags

The early tubular plate was constructed with individual rings by Phillipart and with tubular bags by Woodward were reported in 1890-1900 and the use of slotted rubber tubes (Exide Ironclad) was developed by Smith in 1910.

The assembly of individual tubes on to the spines was practised earlier and this was a slower operation than inserting a complete grid into a multi-tube design. Moreover, the physical bonding between the individual tubes of the multi-tube gives a greater rigidity during the unit operation of filling. The bowing of the spines due to lateral movement is eliminated. These are the reasons why battery manufacturers prefer to use PT Bags multi-tube gauntlets.

Tube preparation. Nowadays multi-tubes or PT Bags (gauntlets) are produced from chemically resistant

glass or organic fibres (polyester, polypropylene, acrylonitrile copolymers, etc.) by weaving, braiding or felting methods.

In the early days of multi-tubes, horizontally woven cloth in a yarn of the copolymer of vinyl chloride and vinyl acetate was used. Two layers of the cloth were passed on either side of a row of cylindrical formers (mandrel) and the seam between adjacent formers was heat welded.

But the vinyl acetate degenerated to release acetic acid which, in turn, resulted in spine corrosion and premature battery failure. Furthermore, heat sealing had to be controlled and dimensioned. If the sealing pressure was exceeded a limit, the seams were weak and soon the layers separated in service. On the contrary, if the sealing pressure was too heavy, the sealed was good but the actual seam was thin and soon came apart in service.

Whilst this did not cause a serious problem in service, there was the tendency for the seam to separate during the initial operations of handling and filling and the centre of the tubular plate tended to bow, which created problems in the following unit operations, e.g., sometimes there was difficulty in inserting the plate into the cell container due to the oversized plates.

Various methods were tried to replace the heat sealing, like composite weaving technique in which the tubes were woven in one operation with the filaments crisscrossing between tubes to form an integral seam. Modern multi-tubes use heat sealing or stitching with polyester filaments woven into cloths or nonwoven polyester cloths.

The attraction of the nonwoven cloths lies in the fact that the

manufacturing cost is lower because of lower basic material cost through the elimination of the weaving process. However, to attain the same order of burst strength, the nonwoven tube has to be thicker than its woven counterpart. This reduces both the working volume of electrolyte (due to the greater volume nonwoven tube material). The volume of active material within the tube is also reduced, which, in turn, reduces marginally the capacity of the cell.

Excellent tubular plates can be made with either individual tubes or multi-tubes provided the yarn used in the making of the tubes is one which does not readily denature in service. Both specially formulated glass and polyester filaments meet this requirement. Tubular plate batteries are either stationary in application or in rolling stock, usually float-charged at a voltage of 2.2 to 2.30 volts per cell, depending on the specific gravity of the electrolyte. Examples are the common inverter/UPS batteries, telephone batteries and train-lighting and air-conditioning cells (TL & AC cells).

Tubular plate filling machine

In a tubular plate, a series of spines of suitable thickness cast from a lead alloy is connected to a top bus bar, either manually or using a pressure die-casting machine. The spines are inserted into tubular bags and the space between the spines and PT bag (also called oxide-holder) is filled with either dry oxide or wet thixotropic paste. The spines are kept in centre position by star-like protrusion provided in the spines. The PT bags are made invariably from woven or felted polyester fibres. The tubular plates so prepared are subsequently pickled, cured/dried

and either tank-formed or jar-formed with suitable electrolyte density.

The filling oxide can have any composition: only grey oxide, grey oxide and red lead (also called "minium") in varying proportions.

The benefit of having red lead in the positive mix is that the formation time is reduced proportionately to the percentage of red lead it contains. This is because the red lead already contains about one third lead dioxide, the remainder being lead monoxide. That is, the red lead



Alternately, the filled tubular plates can be directly assembled, after removing the loose oxide particles adhering to the tubes outside, into cells and batteries and jar-formed.

The negative plate is made as usual by following the flat plate manufacturing practice. The expanders are the same, but, the amount of "blanc fixe" is more compared with an automotive paste. The tubular plates are cured in curing ovens for about 2 to 3 days, after being passed through a drying tunnel heated by electricity or gas to remove the superficial moisture, so that the plates do not stick with each other during the subsequent handling processes.

The difference in the initial filling specific gravity of the acid for pickled and unpickled plates arises from the fact that the former contains more acid and so a lower specific gravity is chosen for pickled tubular plate batteries, usually about 20 points lower. The finishing specific gravity of the electrolyte is 1.240 ± 0.010 at 27°C .

The higher the specific gravity of the electrolyte, the more will be the capacity obtainable from these

batteries, but the life will be adversely affected or, the tubular plates can be tank-formed, dried and assembled and charged as usual.

Types of Tubular plate

Most of the battery manufacturers employ cylindrical tubes for making tubular plates and batteries. Even in this the diameter of tubes and consequently, that of the spines may vary from about 8 mm to 4.5 mm. However, the tubes may also be oval or flat or square or rectangular types. The basic structure is the same as the forerunner cylindrical tubular plates (as shown below in Fig.3).

Advantages of using Tubular plates

Tubular plates are very much noted for their long life because of the absence of shedding of active material. The active material is held by the tubular bag and hence a lower packing density can be used for maximising the coefficient of use. The higher porosity thus resulting can also help in using more active material in the energy production process. The thicker the spine, the more will be the life cycles that can be obtained from such tubular plates. The number of life cycles is anywhere between 1000 to 2000 cycles depending on the thickness of the plates. The thicker the tubular plate, the more will be the number of cycles they give. It is said that the tubular plates can offer twice the number of life cycles when compared with a flat plate of the same thickness.

How the battery life is improved by using Tubular plates?

As discussed above, the life of a tubular plate battery is higher than the flat plate batteries. The following sentences describe the reasons for the longer life expectancy of tubular plate batteries. Most importantly, the active material is rigidly held by the oxide holder tubes, thus preventing the shedding of the material, which is the main reason for the failure of batteries. Also, in the course of time, the spines get a protective cover of lead dioxide which helps in reducing the corrosion rate of the spines. Corrosion is simply, the conversion of the lead alloy spine into lead dioxide. Thermodynamically lead and lead alloys are unstable under a high anodic potential of more than 1.7 to 2.0 volts and under the corrosive atmosphere of sulphuric acid tends to be corroded and converted to PbO_2 .

Whenever the cell is on charge at voltages far removed from the open-circuit voltage (OCV) on the higher side, oxygen is evolved as a result of electrolytic dissociation of water and the oxygen is evolved on the surface of the positive tubular plates and has to diffuse to the spine for corroding it. Since there is a thick layer of positive active material (PAM) surrounding the spines, the oxygen has to travel from the surface by a long distance and so the corrosion rate tends to be reduced. This helps in prolonging the life of tubular plate cells.

Tubular plates are very much noted for their long life because of the absence of shedding of active material. The active material is held by the tubular bag and hence a lower packing density can be used for maximising the coefficient of use.

What battery applications should ideally use tubular battery plates?

Tubular plates are employed mainly for high-capacity long-cycle-life batteries such as in industrial in-house transport vehicles (forklifts, electric cars, etc.). It is also used in OPzS battery for energy storage application like Battery Energy Storage System (BESS), where the capacity of the cells may be as high as 11000 Ah and 200 to 500 kWh and up to a 20 MWh.

Typical applications for BESS are for Peak shaving, Frequency control, Spinning reserve, load levelling, Emergency power, etc

Now days, each and every household in some countries have at least one tubular plate battery for inverter-UPS applications. Not to mention some commercial establishments, for example, browsing centres, where a continuous supply of energy is needed.

Recently, gelled tubular plate valve-regulated lead-acid batteries are extensively used in non-renewable energy systems like solar applications. Here the gelled type is the best suited.

EVs requiring 800 cycles with 40 Wh/kg specific energy can best use the thin tubular EV batteries. The capacity range available is 200Ah to 1000Ah at 5 h rate.

Important technical features of a tubular plate battery

The most important technical feature of the tubular plate battery is its ability to retain the active material throughout its life expectancy without

the shedding process happening in the normal course and thus laying the foundation for long life.

The batteries employing such plates have a long life of 15-20 years in stationary applications under float charge conditions, such as telephone exchanges, energy storage. For cyclic operations (such as traction batteries), the batteries can deliver anywhere from 800 to 1500 cycles depending on the per-cycle energy output. The lower the per-cycle energy output, the higher will be the lifetime.

The tubular plates are best suited for the solar applications in gelled electrolyte valve-regulated version with no stratification problem in the electrolyte. Since it requires no periodic topping up with approved water and since no obnoxious gases are emanating from these cells, they are eminently suited for solar applications.

Conclusion

Of the electrochemical power sources used nowadays, the lead-acid battery outnumbers all other systems considered individually. In the lead-acid battery, the ubiquitously present automotive batteries lead the team. Next comes the tubular plate industrial battery. The automotive batteries have capacities in the range of 33 Ah to 180 Ah, all in monoblocs containers, but the other type has a capacity of 45 Ah to thousands of Ah. □

Do not get attached to worldly things and pursuits. Be in the world, but do not let the world be in you.



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Yours faithfully,

for **Battery Directory & Year Book**
(CHANDRA MOHAN)

He cured a paralyzed Italian woman with just a single command

Swami could speak any language.

– Abhimanyu Kaul –

A former student from Swami's college.

Once, a group from Italy came to see Swami. Among them was a woman who was completely paralyzed; her limbs were contorted, and she had been brought in on a stretcher.

If you recall, Swami usually did not take patients inside; He would speak to them outside. However, if He did take someone inside, He would often bring them out only after healing them. That entire Italian group went inside, while I sat there with the other students. When the interview concluded, both doors opened, and Swami stepped out.

If you remember, Swami would come out, stand near the second pillar, and say, "Chalo" (Let's go). Following this, the men would move off to one side and the women to the other. Just then, an elderly woman—looking every bit like a typical grandmother and wearing a long gown—stepped out. She was heading in the opposite direction when she turned towards Swami.

Swami said, "Yes, Granny, come on!" and she walked towards the Lord! I was seated down below, while the Lord stood on the porch/veranda above. Khayaldas-ji was seated right in front, and I was below.



As the woman approached, Swami took her hand. Her face was wrinkled and very endearing—exactly like that of a typical grandmother. She came forward affectionately and began to speak.

She was speaking in Italian. I looked at Swami, wondering what she was saying. And right then, Swami began to reply to her! The Lord was conversing with that devotee in Italian.

I said, "Swami, I don't understand what is being said." Swami replied, "It's all French to Me." Then, Swami would converse with her and translate for me what she was saying.

Swami would respond and then translate it for me. Watching Swami do this was a truly fascinating experience. A conversation with Swami ensued for a while, giving me the insight that He could speak other languages as well.

Meanwhile, the group was preparing to leave the room. Shortly after, the woman said "bye" and began to settle down or move to leave, and Swami said, "Go." She turned and started walking out.

Just then, Swami looked at me and said, "What do you think of Swami? Your Swami is very powerful; I know all languages." He spoke this sentence with such affection,

then stood up and said, "Hey, move fast—walk quickly."

The group moved forward, and finally, four men emerged carrying the woman on a stretcher.

As soon as they brought the woman out, Bhagavan became very serious—extremely serious. He was standing nearby and gestured for them to place her right there in front. If you have visited Puttaparthi, you can visualize this scene.

Standing near the interview room window, He said, "Put the woman down." The four men turned toward the ladies' side and set her down. Swami stepped down and moved in

front of us, facing the woman. Just as the four men turned away after setting her down, Swami said, "Go!" You know how smartly Swami used to speak—"Go!"—and those four men immediately started running away from the spot.

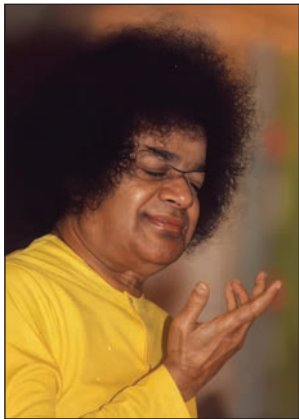
At that very moment, the woman screamed! She shouted out loudly—"Baba!"

You might recall that Puttaparthi used to be very quiet back then. Compared to that, it is very noisy today—modern-day Puttaparthi is extremely loud. In contrast to the 80s, one could literally hear a pin drop back then. There was the constant chirping of birds, and when Bhagavan was present, people would hold their breath—it was such a serene place! And in that quiet atmosphere, the woman's cry rang out—"Baba!"

When she cried out, Swami took two steps towards her. Then He said, "Come." In those days, there was Balbir Aunty. If you are aware, she was a prominent *Rajmata*—a queen in her own right. So, Swami said to her, "Come." That *Rajmata* and another woman—who was in charge there—began walking forward.

Swami was just about to turn towards us when the woman cried out again—"Baba!" Swami turned towards her once more and said, "No more, keep quiet!" Then He gestured to that Aunty, "Come quickly," signaling her to hurry. So, the poor lady started walking a bit faster.

Swami turned back towards us. The Lord had perhaps taken only two steps in our direction when the woman cried out a third time. She



must have put her entire being into that shout—"Baba!" She screamed so loudly that even we were startled, given that she was a paralyzed woman lying on a stretcher.

She had screamed so loudly, yet Swami turned and told her, "Keep quiet!" Then Swami said to her, "Get up!" As soon as Swami said "Get up," she rose and began to walk. You



could truly feel the atmosphere and the energy of the place.

We were all astonished—wondering what had just happened! The Sevalal volunteer (Balbir Aunty), who had been rushing forward, stopped right in her tracks. She

was absolutely stunned—shocked by what had just occurred. The woman kept walking; she walked straight ahead. As she walked, she met Balbir Aunty. It was only when Aunty caught hold of her that she realized, "I am walking!"

Swami gestured from where He stood, "Take her to the wheelchair; she is walking for the first time." He had just signaled for her to walk, and now He was directing that she be taken to the wheelchair. So, people slowly led her away, and Swami kept looking at her. The woman turned slightly—bowing to offer her salutations to God.

God gestured with His hand and turned towards us. When He turned

our way, we were absolutely stunned—it felt as if the very life had left our bodies! I cannot describe it; grasping that energy and expressing it in words is very difficult for me. It was such a powerful and overwhelming energy that we couldn't even comprehend what had just happened!

Swami knew we didn't have the capacity to fully grasp it, so He simply said, "It is done!" and waved His hand. We burst into loud, ecstatic laughter. We felt, "This is our Swami; He has performed this miracle!" So, if we say He is God—possessing all powers—then yes, He is indeed God.

I don't know about anything else; I only know that my Sai is the greatest, my Sai is the most powerful, and He can do anything. I have seen Swami—almost playfully—stopping the clouds and halting the rain. He would stand on the porch and simply command it to stop—"The rain is coming now; it will stop." And it actually happened—rain pouring all around, yet the area right there remained dry! We witnessed this too.

How many of you have seen Swami walking in the rain? We have often seen heavy rain falling, yet Swami remained dry! God would step out in His own mood and unique style. In such moments, He would walk very slowly. Usually, He walked briskly, but on those days, He walked with a delightful, leisurely air. Not a single drop of water would touch His body; only a few tiny droplets would cling to His hair like diamonds, and a few specks would settle on the tips of His sandals. The rest of His body remained completely dry—we witnessed this as well.

Devotees would often say, "Child, please bring back a little sand from Swami's feet." People must have asked you to bring some sand, too. You might remember how the sisters from the Seva Dal used to do such a splendid job of sweeping in those days! They kept the entire ground spotless so that not a single blemish remained; Swami had to walk there, and no other footprints were supposed to be visible. We would casually say, "Yes, we'll bring it; that's easy enough! There is plenty of sand; we'll just pick some up after Swami walks over it."

But we often saw that the Lord would come and go, yet there were absolutely no footprints left behind! The sand remained exactly as it was. We would exclaim, "Oh Lord! At least land—do touch the ground!" Yet, He would simply glide away like the wind.

How often we saw flowers strewn along the path, with Swami walking right over them. His robe would trail behind Him as He walked. Just try wearing your mother's or sister's gown at home and walking around; see how dirty it gets and how it drags up the dust! But here, the ground beneath the Lord was carpeted with flowers, and Swami's robe was at least a foot to a foot-and-a-half longer than His own height. The Lord walked with that long robe trailing, yet not a single flower or leaf would get dragged along behind Him!

What was this phenomenon? His robe would flutter in the air, the flowers behind remained undisturbed, and He walked on the sand without leaving a single footprint! What can one call this? What kind of experience was it? If we call Him God, then God is exactly



who He was. I do not know; all I know is that our God was truly lovely.

He taught us everything through play. He taught us Vedanta while serving us *idlis*, and imparted the essence of *Advaita* (non-dualism) and the purpose of life through lighthearted banter—simply by smiling and being present. Nothing else was needed. One day, I asked God, "Lord, everyone prays, performs elaborate rituals, rings bells, follows prescribed rites—they do it all. Yet, I don't know how to do any of that. Swami, please teach me too." God looked at me and asked, "Why do you want to learn? Why do you want to learn?"

I had expected Swami to say, "Yes, I will teach you; after all, this is exactly what you are supposed to do!" But when He asked *why* I wanted to learn, I reflected—so, just because I don't know how to perform rituals, does that mean I *ought* to learn them? Swami said, "There is no need. Just think of Me and be happy."

Now tell me, where else would

Tribute



Demise of Shri Radheshyam Mangla

Mangla Battery Pvt. Ltd., Delhi's **Sh. Radheshyam Mangla**, father of **Sh. Vinod Mangla**, passed away on 21 August 2026.

A large number of battery people attended the tribute meeting organized on 6th September at Blue Sapphire, Alipore, Delhi to pay tribute to him and prayed for his eternal peace.

Battery Directory family prays to God for the peace of his soul.

you find a God like that? One who neither desires that you perform arduous rituals nor insists that you ring bells. One who wants nothing from you, simply saying, "Be happy; remember Me and be happy." If this is what defines God, then He was indeed God, for He taught me how to be happy. □



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Late Shri Mahendra Kumar Gupta

27 March 1938 - 14 September 2013

Tribute on the 13th Death Anniversary:

An inspiring journey of success, service and devotion to God

For those who witnessed the personality, work ethic, and spirit of service of the late **Shri Mahendra Kumar Gupta**—as well as for everyone associated with the battery industry and social service—September 14th is a day of remembrance. Although he bid farewell to this world on September 14, 2013, he remains alive in people's memories through his deeds, conduct, and social contributions.

Shri Mahendra Kumar Gupta was born on March 27, 1938, in Bikaner, Rajasthan. He arrived in Kolkata in 1958 and assisted a relative in the metal trade. In 1960, he independently ventured into the business of '**Green Label**' wooden battery separators. Subsequently, he carved a distinct niche

for himself in the battery industry through the distributorship of battery containers and '**Microtex**' **PVC Separators**, as well as through his own battery plates.

Business Journey

His business journey expanded significantly in 1960 with the establishment of 'A.K. Auto Agency' at 22, Varanasi Ghosh Street, Kolkata. Over time, his scope of operations grew, and in 1982, he moved to Delhi, where he initiated the marketing operations for '**Mahak Separators**' in North India.

In Delhi, A.K. Auto Agency began operations in the Kashmiri Gate and Karol Bagh areas. Later, on June 7, 1997, an office was established in Gokhale Market. Associates and



A Sai bhajan session was held at their new residence, Sunflower Garden, Kolkata, on January 13, 2012.

numerous traders in the battery industry drew inspiration from his work style and conduct. Through his work and products, he served the battery industry across regions including West Bengal, Bihar, Assam, and Odisha, as well as in Delhi and Mumbai.

Prioritizing Human Values

A significant aspect of his life was dedicated to spiritual and social service. While serving as the **Vice President of 'Shri Sathya Seva Sansthan,'** he made substantial contributions to the establishment of a Child Development Center at the Tahirpur Leprosy Ashram in Delhi, the provision of free homeopathic services, and the publication of '**Likhit**

Jap' (written mantra) notebooks. Whenever he found time, he would personally write the name of 'Sai' in the 'Likhit Jap' notebooks published by the organization. Thirteen years have passed since he departed, yet the values he established remain as relevant as ever. His life's journey conveys the message that qualities such as devotion to God, integrity, a spirit of service, human compassion, and social responsibility are essential for success in business.

Today, on his death anniversary, we remember the late Shri Mahendra Kumar Gupta ji with reverence and offer him our heartfelt tribute.

– Chandra Mohan



The new showroom of AK Auto Agency in Delhi was inaugurated on June 7, 1997.



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