



User Manual



SHORT TUBULAR MAINTENANCE FREE LEAD ACID BATTERIES
FOR SOLAR, INVERTER & UPS APPLICATIONS



Higher Cycle Life Higher Pressure Die Cast Spine Grids Proven Cycling & Deep Cycling Capacities

www.eaplworld.com

Congratulations

Dear Customer

Congratulations on your purchase of Eastman tubular battery, the leading battery manufacturer that supplies batteries to more than 65 countries worldwide.

You've made a first step in saving the overall cost and maintain your peace of mind by taking Eastman efficient & reliable batteries for all your operations.

Installing an Eastman battery will control your wide range of power application requirements for your home or business. We know that you will be satisfied with the performance of our highly efficient wide range of tubular batteries.



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About Us

The Eastman Global group began its journey in the year 1970 with presence in over 105 countries, supply & trading of batteries to OEM's and 2200+ loyal distributor and dealer network across the world. Eastman Auto & Power Limited incorporated by Eastman Group in 2006 is a leading manufacturer of Tall Tubular Conventional Batteries, Tubular Gel Sealed Maintenance Free Batteries, Solar Batteries, E-Rickshaw Batteries and Automotive Batteries.

OUR ACHIEVEMENTS



Important Safety Instructions

A. General Instructions

Battery can present a risk of electrical shock and high short circuit current.

The following precautions shall be followed when working with batteries.

1. Verify that the Power Supply is "OFF" and that power cord is disconnected from the power source.
2. Remove watches, rings or other metal objects.
3. Use tools with insulated handles to prevent inadvertent shorts.
4. Wear rubber gloves and boots.
5. Do not lay tools or metal parts on top of batteries.
6. Determine if the battery is inadvertently grounded, remove source of ground. Contact with any part of a grounded battery can result in electrical shock. The likelihood of such shock will be reduced if such grounds are removed during installation and maintenance.
7. Verify circuit polarities before making connections.
8. Disconnect charging source and load before connecting or disconnecting terminals.
9. Do not smoke, cause a flame or spark in the immediate area of the batteries. This includes static electricity from the body.
10. Use proper lifting means when moving batteries and wear all appropriate safety clothing and equipment.
11. Do not dispose of lead acid batteries except through channels in accordance with local, state and federal regulations.

B. Personal Precautions

Tubular Maintenance Free batteries contain acid, always wear protective clothing and use the correct safety tools.

In case of skin contact with sulphuric acid, immediately

1. Remove contaminated clothing
2. Flush the area thoroughly with water at least 15 minutes with large amounts of water
3. Get medical attention, if required.
4. Apply the solution until bubbling stops, then rinse with clean water.
5. In case of eye contact with sulphuric acid, immediately wash your eyes with plenty of water or take medical attention.
6. Apply a solution of sodium bicarbonate solution (1.0lb/1.0gal or 0.5 kg/5.0 liters of water)



C. Grounding Instructions

ELECTRICAL CONNECTIONS

Follow the instructions given below for safe operation.

- Do not touch un-insulated battery connectors or terminals.
- Isolate the battery from the power plant while working on the battery.
- Insulate all tools to avoid the accidental shorting of batteries.
- Do not allow metal object to rest on the battery or fall across the terminals.
Remove metal wristbands, chains and loose coins from shirt/ overall pockets when working on the battery to prevent accidental shorting.
- Ensure that connections are made as per general arrangements drawing enclosed.
- Do not attempt to move installed battery without removing the connectors.
- Do not expose the battery to open flame or sparks in the immediate vicinity.
- Do not tamper with cell vent plugs.
- Keep the battery clean and dry.
- In case of accidental contact with acid, wash the affected area with a continuous flow of water for 15 min. and consult a doctor immediately.

D. Safety Precautions

- Use insulating equipment such as gloves, shoes and eye protectors.
- Insulate all tools required for installation (wrenches, spanners etc).
- Avoid keeping the tools across the battery terminals.
- Wipe the contact surfaces clean with dry, lint free cotton cloth.
- Avoid cleaning the cell directly with liquids (gasoline, paint thinner etc.) or with liquid impregnated cloth.
- Connect the batteries to the load firmly with the help of stainless steel bolts & washers.



Short Tubular Maintenance Free Battery Installation

General

Batteries shall be unpacked, installed and charged as soon as possible after receipt. However, if this is not possible, follow the instructions below for storing the battery before installation.

A. Storage Location

Store the batteries indoors in a clean, dry and cool location away from direct sunlight and rain. Storage at higher temperatures will result in accelerated rates of self-discharge and possible deterioration of battery performance and life. Place the packing boxes on the floor as indicated by the arrow on the packing box. Do not stack packing boxes one over the other more than two **DAMAGE MAY OCCUR AND THE WARRANTY MAY BE VOIDED**. The maximum storage period from the date of dispatch is 3 months for batteries stored at ambient temperatures. Do not store batteries supplied in factory charged condition for a period beyond 3 months without giving freshening charge. *

*This period applies only to an average ambient temperature of 27 °C. For every 10°C rise in temperature, storage period decreases by one half (Refer Below chart and Graph).
Self Discharge (Storage Period & Temperature).

Storage Temperature	Max Storage Period
< 25 °C	3 Months
25°C - 35 °C>	2 Months
35 °C	1 Months

Shelf Life Graph

If storage period exceeds the storage period recommended in above table give the battery freshening charge before the end of the recommended storage interval

B. Installation and Commissioning

Unpacking and Handling for Installation Follow the instructions given below for unpacking at the installation site. (Strongly recommended). Cut metallic straps with the help of cutter or pliers.

- Remove the battery carefully from packing box and keep it on the floor in the upright position
- **DO NOT** lift any battery by the terminal posts as this will void the warranty.
- Follow the instructions given below for unpacking at the installation site. (Strongly recommended).
- Cut metallic straps with the help of cutter or pliers.
- Remove the battery carefully from packing box and keep it on the floor in the upright position
- **DO NOT** lift any battery by the terminal posts as this will void the warranty

C. Location

1. Choose a cool and dry location for the batteries away from sunlight.
2. Do not place them nearby a source that helps ignition.
3. Minimize temperature variations between the cells. (To avoid temperature variation between the batteries, do not locate the battery near HVAC ducts or exhausts, heats sources (i.e., equipment that generates heat) or direct sunlight.
4. Provide a minimum free space of 1-meter on all sides of the battery string for free air circulation, easy assembly, and periodic checks during its operation.

D. Freshening Charge

Batteries lose some initial charge during shipment and storage. Depending on storage time, a battery may require a freshening charge.

Give freshening charge for batteries as given below:

- When they are store beyond 3 months.
- Failure to give freshening charge voids the battery's warranty.

Freshening Charge Details :

Charging voltage: 15.8 V (CC Charging).

Charging current: limited to a maximum 10% of the C10 capacity.

Charging duration: As per the battery state of charge (SOC)

E. Charging Methods (Constant Voltage Charging @ 27°C)

- Stand By Use
 - Charging Voltage - 14.4 V / battery
 - Maximum Charge Current - 10% of the Ah Capacity
- Cyclic Use
 - Charging Voltage - 14.2 V / battery
 - Maximum Charge Current - 10% of the Ah Capacity
- Temperature Compensation - 5 millivolts/ battery/°C

F. Connection Method with Inverter/System:

The following connection points should be considered when connecting your battery with Inverter / Solar systems

1. The length between wire and inverter / system should not be more than approx 1 meter (recommended), if more than 1 meter then it will lead to reduced battery battery back up due to wire losses
2. Recommended wire size is 10 Sq. mm
3. Before connecting the battery to Inverter/Solar System apply petroleum jelly to the battery terminals.
4. Connection should not be losses across the battery terminals after complete installation.

Wire Guage Sizes & Torque values - For Terminals

Wire Gauge Size (AWG)	Ampacity (amps)
12	30
10	40
8	55

Terminal Type	Torque (In lbs)
L	70-89

General Tools



Fig: Flat Head Screwdriver



Fig: Open end spanner/ratchet

Know Your Battery

What Makes Our Battery Superior?

Alloy

- Unique Hybrid Alloy abled for High cycle life with low water loss and Corrosion resistant

Spine

- High pressure Di - casted spines which lead to less corrosion and higher life cycle.
- The number of spines have been increased to accommodate more active material in a single plate which results in higher capacity per given size.

Gauntlet

- High bursting strength polyester material which prevents active material shedding
- High porosity & low electrical resistant material results in higher charge efficiency
- Improved woven gauntlet gives higher active material utilization & higher capacity

Separator

- Low electrical resistance with improved acid mixing & uniform element compression with closer rib pitch leads to increase in the performance.

Process

- Unique 4-step curing program good adhesion of active material to the grid leads to higher cyclic life.

Paste Recipe

- Special additives and optimized negative paste recipe for faster charge acceptance.

Charging Process

- Automatic PLC based high precession ADOR chargers used to optimum charging
- Programming, data logging and monitoring through PC
- Battery charging with temperature controlled water tub

Tubular Plate Technology

As the name suggests, it is a design in Tubular form for the positive plate and grid pasted design for the negative plate in order to accumulate more active material as compared to other plate technologies. Raw Material used for enhanced battery performance.

- Pure Lead Alloy
- Optimized antimony lead – improves cycle life and reduces water loss
- Polyethylene separator with higher thickness sleeve type
- Aesthetic container made of polypropylene with robust drop test passed.
- Gauntlet – 100% polyester with resin less than 24%
- Industrial LR grades sulphuric acid
- Optimum use of red oxide







Technical Specification of Tubular Maintenance Free Batteries

Battery Type	Product Code	Nominal Voltage (V)	Capacity (Ah) @C20	Cycle Life	Overall Dimension		
					L	W	H
Short Tubular Maintenance Free	EM150SMF	12	150	600 Cycle at 80% DOD @ 27°C	512	212	273
Short Tubular Maintenance Free	EM200SMF	12	200	600 Cycle at 80% DOD @ 27°C	512	212	273

Advantages

- Tubular Positive Plates – Proven cycling & deep cycling capabilities.
- Hybrid Alloy - Very Low Self Discharge
- High Pressure Die Cast Spine Grids – Rate of grid corrosion is very low and hence floats life.
- Supplied in filled & charge condition –100% capacity on first discharge
- Separator- Low Resistance Separator for Low Water Loss

Key Benefits

-  Higher Charge Efficiency
-  Low self-discharge
-  Zero maintenance for 450 cycles or 1 Year @ 27°C & higher life cycle
-  Suitable for frequent power cut areas
-  Recommended for tropical climates even on heavy load
-  Eco-Friendly aqua trap vent plugs ensuring less fumes and no spillage during transportation

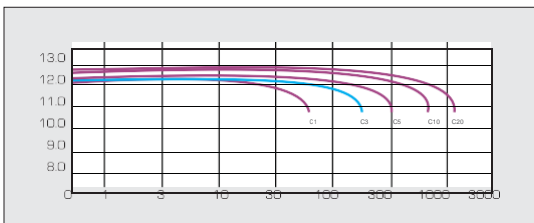
Unique Features

- Thicker & Wider Spines for long life and deep cycle applications.
- Hybrid Alloy for zero maintenance for 450 cycles or 1 Year @ 27°C
- High porous & oxidation resistance gauntlet for extra backup & long life
- Advanced carbon used for enhancing performances

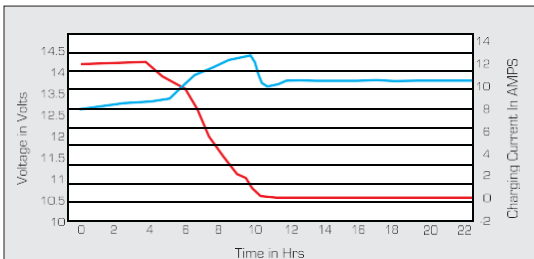
Product Technology

Discharge Rates

When selecting and sizing a battery these discharge rates can be considered



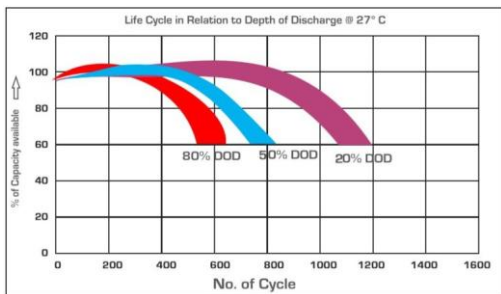
Small Tubular Maintenance Battery - Constant Voltage Charging Profile :



Cycle Life:

Cycle life depends on the depth of discharge. Higher the depth of discharge lesser the cycle life and lesser the depth of discharge higher the cycle life expected

Expected Cycle Life



Battery Selection Chart:

Selecting the correct battery for the correct application is a key for long battery life

Battery Selection Chart for Eastman Range of Inverter Batteries

Sl No	Electrical Load (With reference to Max. Inverter Rating)	Appliances Load	Max Inverter Rating	System Voltage	Recommended Battery @ C20 for Different Backup Time			
					5.0 Hrs.	4.0Hrs.	3.0 Hrs.	2.0 Hrs.
					Electrical Load			
1	250 VA	1 Light Bulb + 1 Ceiling Fan	250 VA	12V	EM 15048ST/EM 15010TT/EM 15048TT/EM 15048TT/EM 15010TT/EM 15048MF	EM 15048ST/EM 15010TT/EM 15048TT/EM 15048TT/EM 15010TT/EM 15048MF	EM 15048ST/EM 15010TT/EM 15048TT/EM 15048TT/EM 15010TT/EM 15048MF	EM 15048ST/EM 15010TT/EM 15048TT/EM 15048TT/EM 15010TT/EM 15048MF
2	350 VA	2 Light Bulb + 1 Ceiling Fan	350 VA	12V	EM 15048TT/EM 15048TT/EM 15010TT/EM 15048MF	EM 15048ST/EM 15048TT/EM 15048TT/EM 15010TT/EM 15048MF	EM 15048ST/EM 15048TT/EM 15048TT/EM 15010TT/EM 15048MF	EM 15048ST/EM 15048TT/EM 15048TT/EM 15010TT/EM 15048MF
3	650VA - 700 VA	2 Light Bulb + 1 Ceiling Fan + 1 (25") Colour T.V.	650VA - 700 VA	12V	JP - EM 15048ST/JP - EM 15010TT/JP - EM 15048TT/JP - EM 15048TT/JP - EM 15010TT/JP - EM 15048MF	JP - EM 15048ST/JP - EM 15010TT/JP - EM 15048TT/JP - EM 15048TT/JP - EM 15010TT/JP - EM 15048MF	EM 2300TT/EM 200TTFM/EM 15048MF	EM 2300TT/EM 200TTFM/EM 15048MF
4	800VA - 900 VA	4 Light Bulb + 2 Ceiling Fan + 1 (25") Colour T.V.	800VA - 900 VA	12V	EM 2300TT/EM 200TTFM/EM 200A48MF	JP - EM 15048TT	JP - EM 15048ST/JP - EM 15010TT/JP - EM 15048TT/JP - EM 15048TT/JP - EM 15010TT/JP - EM 15048MF	EM 2300TT/EM 200TTFM
5	1050VA - 1100VA	2 Light Bulb + 1 Ceiling Fan + 1 Desktop Computer	1050VA - 1100VA	12V	JP - EM 15048ST/JP - EM 15010TT/JP - EM 15048TT/JP - EM 15048TT/JP - EM 15010TT/JP - EM 15048MF	JP - EM 200TTFM/JP - EM 200A48MF	JP - EM 9048TT/JP - EM 9048TT/EM 200 TTFM/EM 200A 48MF	JP - EM 15048ST/JP - EM 15010TT/JP - EM 15048TT/JP - EM 15048TT/JP - EM 15010TT/JP - EM 15048MF
6	1450VA - 1500 VA	3 Light Bulb + 2 Ceiling Fan + 1 Desktop Computer + 1 (25") Colour T.V.	1450VA - 1500 VA	12V	EP - EM 20048TT/EP - EM 20048TT/EP - EM 200TTFM/EP - EM 200A48MF	JP - EM 2300ST/EP - EM 200TTFM/EP - EM 200A48MF	JP - EM 15068TT/JP - EM 200TTFM/JP - EM 200A48MF	JP - EM 2300TT/EP - EM 200A48MF
7	1850VA - 1900 VA	3 Light Bulb + 2 Ceiling Fan + 1 Desktop Computer + 1 (25") Colour T.V.	1850VA - 1900 VA	24V	25 X 2P - EM 20042TT/25 X 2P - EM 20048TT/25 X 2P - EM 200TTFM/25 X 2P - EM 200A48MF	25 X 2P - EM 16048TT /25 X 2P - EM 16048TT	25 X 2P - EM 15048ST/25 X 2P - EM 15010TT/25 X 2P - EM 15048TT/25 X 2P - EM 15048TT	25 - EM 2306TT/25 - EM 200TTFM

1. Cut-off voltage of Inverter considered 10.5V (Minimum).
2. S- Series connection, P- Parallel connection. Eg. 25X 2P- 2 Batteries shall be connected in series in a string and such 2 strings shall be connected in parallel
3. There shall be an periodic equalising charge for every three months form the date of installation
4. Light Bulb- 60 Watts Each; Ceiling Fan- 100 Watts Each; Colour T.V. (25")-150 Watts Each; Desktop Computer- 450Watts Each

* User Conditions Only

Maintenance & Troubleshooting Instruction

Maintenance

Batteries lose some initial charge during shipment and storage. Depending on storage time, a battery may require a freshening charge.

Battery Cleaning

Observe the battery for cleanliness at regular intervals. Keep cell terminals and connectors free of corrosion. Terminal corrosion could adversely affect the performance of the battery, and it could present a safety hazard.

Standard Cleaning

To perform a standard cleaning of the battery, follow the procedures below:

1. Disconnect the battery.
2. Wipe off any accumulation of dust on the battery covers with a cloth dampened in clean water.

Apply Petroleum Jelly on Fasteners

1. Disconnect the battery.
2. Remove corrosion by wiping with a cloth dampened with bicarbonate of soda solution follow with a cloth dampened with clear water.
3. Dry with a clean cloth.
4. With a small paintbrush, apply a light coat of heated NO-OX-ID grease to the entire bolted connection.

Do Not use any type of oil, solvent, detergent, petroleum-based solvent or ammonia solution to clean the jars or covers. These materials will have an adverse affect and cause permanent damage to the battery jar and cover and will void the warranty.

Warranty Conditions

- Warranty is null and void for those batteries, which have been store for more than 3 months without giving any freshening charge.
- Warranty claims will not entertained in case where operating instructions are not strictly followed.
- Warranty will cease if the units are opened or tampered with or an attempt is made to repair the battery by any person other than manufacturer's representative.
- Warranty is not applicable for damages due to natural calamities such as floods, thunderstorms, lightning strikes & earthquakes.
- Warranty is applicable only for those batteries for which the service records have been maintained as per the guidelines given in this booklet.
- Physical damage claims made from places other than delivery points which are not covered by the warranty.
- Litigation arising out of any transaction with the company is subject solely to New Delhi jurisdiction.

Do's and Don'ts

Do's

- Store the batteries in a cold and dry location, when not in use.
- Keep the batteries away from the heat source, sparks, fire, direct sunlight, rain etc.,
- Keep the batteries clean and dry.
- Refresh (Charge) the battery once in every 3 months, if stored for longer periods.
- Check the tightness of the electrical connections for every month.
- Monitor charge voltage / current at monthly intervals and adjust it, if required.
- After discharge recharge the batteries immediately.
- Note down and record the battery voltage readings once in every month.
- Use insulated tools only during installation to avoid the short circuit of a battery.
- Note: Apply correct torque 8 – 10 Nm for tightening the bolts.
- Top Up with DM Water Only

Don'ts

- Do not expose the packed batteries to rain and sunlight.
- Do not add water or acid.
- Do not make tap connections.
- Do not mix batteries of different types & makes.
- Do not charge the batteries in sealed cubicles.
- Do not short-circuit the battery
- Do not exceed the storage period without giving the freshening charge.
- Do not discharge the batteries below 10.50V.

(Note: Do not over tighten the bolts.)

FAQ's

What is Tubular battery?

Tubular Battery is a type of lead acid battery in which the positive electrode is not a grid, but a comb like lead skeleton that holds the positive material with the help of tubular bags. The structure looks like a series of tubes kept side by side along the length of the electrode, hence the name 'tubular'.

How can the SOC(State Of Charge) of a tubular battery can be accurately measured ? State of Charge can be correctly measured by measuring the specific gravity of the electrolyte with the help of an instrument called Hydrometer.

What is the Specific Gravity of a fully charged battery ?

The SG for a fully charged battery is 1.260 (± 0.01).

What is the frequency of Top up in STMF Battery ?

No Water Top Up required before 450 cycles or One Year @ 27°C & higher .

If water loss is noticed in STMF, what will customer do ?

If water loss observed less within 450 cycles or One Year @ 27°C & higher or after one year, De Mineralized (DM) water should be topped up.

Will water top up can extend the life of the battery ?

Yes it can extend the life of the battery after 450 cycles or One Year @ 27°C & higher.

What type of water should be used for top-up ?

The recommended water topping up should only be done with DM (De Mineralized) water which is available at battery sellers. No other form of water should be used as it may contain excess mineral content which can contaminate the electrolyte leading to pre- mature failure of the battery.

FAQ's

What are the common mistakes made in tubular battery?

Undercharging - Leaving the battery in partial state of charge or storing the battery in discharged state results in sulphation leading to premature failure of the battery.

Operating temperature of Short Tubular Maintenance Free Battery?



Can operate between -20°C to 55°C for optimum output.

Can we use Short Tubular Maintenance Free battery for Solar Application?

Yes this battery can be used for Solar applications.

What is the shelf life of battery?

3 months @ 27°C or can be checked as per SOC Level Chart mentioned in Technical Data Sheet.



Thankyou



Eastman Auto & Power Ltd would like to thank you for keeping your faith and trust in us. We value your trust in our company, and we will do our best in meeting your expectations.

For two decades we are serving our customers by providing customized battery power solutions backed by outstanding technical support.

We will continue to serve your battery needs and look forward for your continuous support in future.

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