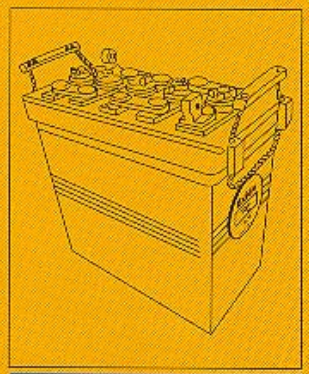
EXIDE

INDUSTRIAL



LOW MAINTENANCE

EMU

BATTERIES

Introduction

Exide Industries as leading battery manufacturers, now offer a range of modern batteries for use on electric locomotives and electric multiple units. In designing these batteries, Exide has drawn on their unrivalled battery technology, supported by the latest research together with their extensive experience in manufacturing lead-acid batteries for service on the Indian Railways, to make a product of the highest quality and life. The batteries have been approved by RDSO, Lucknow for supply to Indian Railways.

General Description

The battery (unit) is made up of 5-cells, assembled in a 5-cell monobloc to make a 10-volt unit. Batteries (units) are available in two sizes of 75 and 90 Ah capacity, respectively. Ten such 10-volt units normally comprise a 100-volt battery. Both units (10V75Ah and 10V90Ah) fully, conform to RDSO specification PE-EMU/SPEC/0014-2000

The special feature of these batteries is the incorporation of low maintenance characteristics i.e minimum topping up frequency.

Description of Main Components

Positive Plates for 5EMU75TLM are of tubular design which is the main feature to withstand rugged application & abuse.

Positive Plates for 5EMU90LM are flat, pasted plates of rugged design, wherein lattices hold the active material in firm contact with the grid under all conditions of long and strenuous service.

Negative Plates are stout, pasted plates with improved active material for long life and efficient service.

Separators for 5EMU75T-LM are of microporous PE envelope which are sufficient for usuage with robust tubular positive plates.

Separators for 5EMU90LM has dual separation comprising microporous polyethylene envelopes and glass-wool mats are fitted between each pair of plates. The glass-wool retainer mats press firmly on both sides of the positive plates, effectively restraining shedding of active material under the arduous conditions of railway service.

Cell Lids are moulded of high quality talc filled PP and are flanged to form a deep trough to provide an effective bituminous seal between lid and container.

Vent Plugs are threaded plastic plugs with microporous ceramic dome and a baffle and expansion chamber so that gases are allowed free passage, but all acid spray is arrested and returned to the cell.

Separator Guard of plastic protects separators while servicing of the cell is being done.

Pillar Sealing – all pillars are effectively sealed by welding them to a lead insert in the lid.

Terminals – lug type terminals (suitable for bolted connections) of antimonial lead are provided on the batteries.

Container – the container is a monobloc moulded of the highest quality rubber to withstand the toughest service conditions. Adequate sediment space has been provided at the base to prevent bridging short-circuits. Non-corrodable,strong PP rope handles are incorporated for handling.

Unpacking

The battery should be kept upright while unpacking. The cells should be carefully examined for any evidence of damage in transit. All damages should be immediately reported.

Capacities, Weights, Dimensions

Type	Capacity at 5-h rate	Dimensions (max.)			Weight with electrolyte (approx.)	Approx. volume filling in acid (1.230)	Charging Currents	
		L	W	H upto take offs			Initial charge	Normal charge
	Ah	mm	mm	mm	kg	litres	A	A
5EMU 75T-LM	75	356	172	360	42	8.0	4.0	7
5EMU 90LM	90	356	172	360	46	7.5	5.0	8

Note : 1. The working or fully charged sp. gravity is 1.250±0.005 (27°C).
2. The rated capacity is at the 5 hr. rate/27°C/1.250 (27°C) to 1.75 volts per cell.

Pilot Cells

Select one of the cells for use as a 'Pilot' to indicate the general condition of the battery. The pilot cells should be easily accessible and if the battery is divided into sections, a pilot cell should be selected in each.

Charging

The battery should be kept approximately fully charged by adjusting the voltage regulator on the generator to suit the service conditions. The amount of charge preferably should be such that the specific gravity of the electrolyte is ordinarily within the limits of 1.245 to 1.255.

Undercharging is indicated by the specific gravity being frequently below 1.220 or by the specific gravity gradually falling over a period. The voltage regulator should be adjusted to give an increased rate of charge to prevent undercharging recurring.

Overcharging is indicated by the specific gravity of the electrolyte being generally beyond fully charged value i.e. about 1.250 and by unusually frequent (say weekly) topping up being required. In this case the voltage regulator should be adjusted to a slightly lower voltage setting.

How to ascertain State of Discharge

The specific gravity of the electrolyte gives a direct indication of the state of discharge of the battery. The table given below shows the specific gravity at various stages of discharge, after correction to 27°C.

Cell condition against specific gravity at various Stages of Discharge

Fully charged	1.250 (1.245-1.255)
Half discharged	1.160 (1.155-1.165)
Fully discharged	1.070

Bench Charges

Charge at the normal rate given in the table and continue charging until the voltage and the specific gravity of the electrolyte in each cell have reached a maximum and show no further rise over three successive hourly readings. All cells should be gassing freely and the expected top of Charge Voltage should exceed 2.7v.p.c.

It is possible to start a "bench charge" at a higher current (up to double the value given) in order to reduce the time of bench charging. The current must be reduced to the normal charge current when gassing commences (i.e. at about 2.35 volts per cell).

Temperature

The maximum permissible operating temperature of the battery is 54°C. If this temperature is exceeded frequently, or for any considerable time, the life of the battery will tend to be reduced. **This temperature is the electrolyte temperature and not the ambient trremperature.**

Temperature Correction

All specific gravity readings should be corrected to 27°C. For each 10° above 27°C add 7 points (.007) to the hydrometer reading. For each 10° below 27°C subtract 7 points (.007) from the hydrometer reading.

LOW MAINTENANCE ELECTRIC LOCO / E.M.U. COACH BATTERIES

As per RDSO spec. PE-EMU/SPEC/0014-2000

	Type	75Ah	90Ah
(a) Make		EXIDE	EXIDE
(b) Type of unit		10 V 75 Ah Monobloc	10 V 90 Ah Monobloc
(c) Manufacturer's nomenclature		5EMU 75TLM	5 EMU 90LM
(d) Overall dimensions of unit (approx.)			
	L	354±2 mm	354±2 mm
	W	170±2 mm	170±2 mm
	H	357±3 mm	357±3 mm
(e) Weight per unit with electrolyte (approx.)		42±5% Kg.	46±5% Kg.
(f) Cell container material		Moulded hard rubber with PP Rope handles.	
(g) Type of positive plates		Tubular Gauntlet	Flat, pasted
(h) Type of negative plates		Flat, pasted	Flat , pasted
(i) Type of separators		Microporous PE envelope	Microporous PE envelope with glass wool
(j) Max. electrolyte temperature that the cell/ battery can withstand without any damage			
(1) Continuously		48°C	48°C
(2) For short periods		54°C	54°C
(k) Electrolyte height above the top of the separators		80 mm	50 mm
(l) Clearance between plates and bottom of the container		16 mm	16 mm
(m) Quantity of electrolyte per unit		8.0 litres	7.5 litres
(n) Sp. gr. of electrolyte for initial filling at 27°C		1.230 ±0.005	1.230 ±0.005
(o) Details of initial treatment recommended		4.0A	5.0A
(p) Material of terminal take-off and intercell connectors		Antimonial lead	
(q) Material of interunit connectors		Flexible copper cable, insulated	
(r) Normal charging rate		7.0A	8.0A

Schedule of Performance – Type Tests

(a) Air Pressure Test, 15 secs. (mm. of water)	670	670
(b) Ah. capacity at 5 h rate of discharge to 1.75 V per cell at 1.250, 27°C (Ah)	75	90
(c) Ah efficiency (%)	96	96
(d) Wh efficiency (%)	82	80
(e) Retention of charge – Loss over 28 days (%)	4.5 max	4.5 max
(f) Life test – life units (min)	16	16
(g) Max. period of dry storage (months)	24	24

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