

## PERFORMANCE CHARACTERISTICS OF SLI BATTERIES ASSEMBLED ACCORDING TO THE CECRI PROCESS

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A process know - how for commercial production of lead - acid batteries of SLI type has been developed in this Institute. The batteries ranging in capacity from 60Ah to 135Ah were tested according to IS:7372 - 1974 and found to pass all the tests successfully. In this paper the performance characteristics are reported and discussed.

**Key words:** SLI batteries, battery capacity

### INTRODUCTION

Lead acid battery still continues to be the most used secondary power source in spite of extensive and continued efforts at finding out new, light weight and low - cost secondary battery systems. The conventional use of lead acid battery for SLI application is well met by the performance characteristics of the present day battery and millions of batteries are produced and used in this field. The country is self sufficient with respect to these batteries and the industry is well organized to meet the growing demands of the future. Almost all types of lead acid batteries are being produced in this country for various consumers including defence. Most of the organised sector of the industry are under foreign collaboration with one country or the other. Several new collaborations are being granted although battery production technology in this country is well established for over 40 years. There are several small scale manufacturers who mainly produce SLI batteries and meet a considerable portion of the demand. But the production technology adopted by them varies and hence the produce also has its own variations. It was considered that a standard technology should be available to the small scale manufacturers and hence CECRI took up the task of developing an indigenous technology for SLI batteries.

The technology has been developed upto a capacity of 180Ah. The performance characteristics of these batteries have been successfully tested as per IS 7372 - 1974. The results of the performance characteristics of these batteries made for trials in the last tow years are presented in this paper.

### TECHNOLOGY IN BRIEF

Lead antimony grids with 5 to 6% antimony and 0.05 - 0.15% tin is used as the grid alloy. Gravity casting process is generally adopted for the small scale production. Some of the licencees who want to switch over to medium scale will use automatic casting process. Small additions of arsenic is also recommended to improve corrosion resistance. The design of the grids conform to the conventional one and use of thinner grids for special purpose batteries have also been adopted. Grey oxide is used as the raw material for producing the plate. The process of paste preparation and its

control is well monitored. The pasting process and the weight distribution of the paste are kept under close control. Additions to the paste such as carbon black to the positive and expanders to the negative are also recommended. The advantages of this addition have been studied in detail before they were specified. The process of curing and forming are adopted as per industrial practice and plates are assembled in the conventional way. For special purpose batteries such as electric vehicle battery, aircraft battery, low temperature battery, etc additional innovations have been made to meet the performance requirements. Seven licencees are under production including M/s Hindusthan Aeronautics Ltd., Bangalore who are producing batteries for low temperature applications ( $-20^{\circ}\text{C}$ ). The process for producing batteries for low temperature application was specially developed for HAL for their captive use and has been found to pass the required specifications of HAL.

### RESULTS AND DISCUSSION

The results of performance characteristics of 11 numbers of 12V-135 Ah batteries are presented in Table I. The tests were carried out as per IS 7372 - 1974.

The average capacity obtained for all 11 batteries tested is 123.8 Ah at 10 hour rate. The capacity obtained is 5 Ah more 4.2% in excess of the nominal capacity of 118.8 Ah as per IS specification. The standard deviation obtained is 2.86. These figures go to show that the quality control procedures are well within the limits of economic overrating of commercial battery. Similarly the other results can be analysed to show that the process knowhow conforms to the accepted quality and process control norms.

### CONCLUSION

The batteries assembled ranged from 60 Ah to 135 Ah, and conformed to the IS specification 7372 - 1974.

See overleaf for Table-I

TABLE - 1

Test	Capacity 10 hr. rate Ah.	High rate discharge at normal temperature Min. Sec.	High rate discharge at low temperature Min. Sec.	Retention of charge (loss after 28 days)	Life test		Resistance to over charge	
					Min.	Sec.	Min.	Sec.
I.S. Specification	118.8	5 - 30	3 - 30	Loss will be within 20%	4	- 0	4	- 0
Battery No.								
1	122.6	6 - 45	5 - 37		(1)	7 - 02		
					(2)	4 - 35		
					(3)	5 - 07		
2	121.6	6 - 18	5 - 28		(1)	6 - 51		
					(2)	5 - 20		
					(3)	6 - 37		
3	123.8	6 - 27		1.29%				
4	121.0	6 - 35		1.71%			(1)	8 - 30
							(2)	6 - 50
							(3)	6 - 41
							(4)	6 - 01
5	125.8	6 - 47					(1)	8 - 00
							(2)	6 - 57
							(3)	6 - 41
							(4)	6 - 01
6	122.6	6 - 32						
7	129.7	6 - 35	5 - 39		(1)	7 - 26		
					(2)	6 - 30		
					(3)	6 - 15		
8	120.9	5 - 56	5 - 12		(1)	5 - 30		
					(2)	4 - 35		
					(3)	4 - 30		
9	120.8	6 - 55		0.92%			(1)	7 - 15
							(2)	6 - 15
							(3)	6 - 28
							(4)	6 - 50
10	126.9	7 - 07		0.28%				
11	124.9	7 - 07					(1)	7 - 05
							(2)	6 - 17
							(3)	6 - 25
							(4)	6 - 50