THE REPEATABILITY INVESTIGATION OF IMPEDANCE SPECTRUM FOR SLI LEAD ACID BATTERIES

Can Aksakal¹, Altuğ Şişman², Burak Barutçu², Sinan Yılmaz³

¹ İnci Akü San. ve Tic. A.Ş., Organize Sanayi Bölgesi 2. Kısım 45030, Manisa, Turkey
² Istanbul Technical University, ITÜ Enerji Enstitüsü, Ayazağa Kampüsü 34469 İstanbul, Turkey
E-mail: caksakal@inciaku.com; sismanal@itu.edu.tr; barutcub@itu.edu.tr; syilmaz@inciaku.com

The aim of this preliminary work is to investigate the repeatability of an impedance behavior of SLI (starting, lighting, ignition) type automotive batteries. The impedance tests are performed on a computer controlled electronic load which is driven by an impedance analyzer.

A DC offset current is set to a certain value than an AC perturbation current is added to that DC offset current and impedance analysis tests are conducted via this “Hybrid” galvanostatic mode in the frequency range between 10 kHz to 1 mHz. During these experiments ambient temperature is set to 25°C to avoid temperature effect on batteries. Each experiment lasted approximately 5 hr to investigate whole spectrum and according to battery capacity DC offset current is set to a value which decreases the battery capacity 10% during the experiment.

Experiment sets are designed to decrease the battery capacity down to 40% of their rated capacity with 6 experiments. Impedance behavior is recorded during these tests to see the effect of SOC (state of charge) on real and imaginary resistances. After that battery is charged with an appropriate charging method to start the test over to investigate the repeatability of the impedance results of the battery during the frequency spectrum from 10 kHz to 1 mHz.