Electrical Resistivity Measurement of Carbon Anodes Using Van Der Pauw Method

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Abstract

Electrical resistivity of carbon anodes is an important parameter in the overall efficiency of aluminium smelting process. In order to characterize their electrical resistivity, a cylindrical core is extracted from the top of the anodes. The electrical resistivity of the core samples is measured according to ISO 11713 standard. This method consists of applying a 1A current along the revolution axis of the sample, and measuring the voltage drop on its side, along the same direction. Theoretically, this technique appears to be satisfying, but cracks in the sample, either generated during the anode production, or while coring the sample may induce high variations in the measured signal. Van der Pauw method, as presented in 1958 by L.J. van der Pauw, allows measuring the electrical resistivity of any plain sample with arbitrary shape and low thickness even in the presence of cracks. In this work, measurements were performed using both standard and van der Pauw method, on both flawless and cracked samples. Results provided by van der Pauw method appeared to be more reliable and repeatable.

Keywords: Carbon anodes; aluminum smelters; electrical resistivity; van der Pauw.