

A New Lining Material for Aluminum Electrolysis Cells that Can be Recycled

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Abstract

The paper discusses several technical, environmental and economic problems related to lining materials used in aluminum reduction cells, including the possibility to re-cycle them. The paper suggests that lignite semi-coke be used instead of conventional thermal insulation materials and refractory bricks. It also discusses the method of preparation of such a material and the results of laboratory studies of the properties of the material. The paper describes the equipment and technology used to apply this new lining material; it discusses original compacting equipment that can be used for un-shaped refractory materials. Also, the barrier layer properties are given. Moreover, the authors describe the concept of the cell that uses the new lining material, including the results of industrial pilot tests of such a cell. Furthermore, the paper discusses the results of an autopsy of an 887-day-old cell, in which lignite semi-coke was used. It was found out that 80% of the new lining material can be re-used, which improves both the environmental safety and economic efficiency of the process of aluminum production.

Keywords: Cell lining materials; electrolysis cells; lignite semi-coke for cell lining; cell lining material recycling.