

ACCUREC GmbH, Mülheim

AUDIT Summary NiCad

Oktober/November 2012

The production site of ACCUREC Recycling GmbH in Mülheim/Germany basically is a recycling plant for NiCd *and NiMH* batteries. The purpose of this audit is to validate the Recycling Efficiency for NiCd batteries using this technology according to the rules specified in the European Directive 2006/66/EC and the European Commission Regulation No 493/2012.

The ACCUREC recycling process in Mülheim is based on a *pyrolysis and Cd* distillation process conducted in vacuum induction furnaces. Batteries delivered, are weighted, labelled and sorted manually to remove impurities and to separate battery packs from single cells. Battery packs are controlled crushed in an impact mill and plastics are separated from single cells without damaging. Subsequently the NiCd cells are charged in a vessel and inserted into a vacuum induction furnace. While heating step-wise up to 850°C, firstly water and volatile organic compounds (VOC) of the cells are evaporated. Secondly Cd(OH)₂ is decomposed, CdO is reduced and Cd evaporated finally. The furnace is connected to a condenser which converts the Cd vapour to Cd-metal-ingots. Ni and Fe remain in the vessel. Water and volatile organic compound (VOC) are collected in a second liquid vacuum-condenser. The Cd-free battery residue consists mainly of Nickel and Iron and is a marketable product. The Cd metal has a high purity and is sold mainly to the battery industry.

The audit took place in the period from the 29th October to 2nd November 2012. During that period a MIMITech-Auditor visited without notification the plant, inspected the NiCd battery recycling process and took any samples necessary to evaluate the process. The auditor had full access to any facility received all information about the process and previous batches. The auditor choosed two batches randomly of the weeks work load, took samples and weighted all input/output flows during the entire process.

MIMITech GmbH certifies that the NiCd recycling process of the ACCUREC Recycling GmbH achieves a "Recycling Efficiency" of 78,28% /batch 1) up to 79,62% (batch 2), which is obviously above the 75% minimum recycling targets of the European Directive 2006/66/EC. Due to the special process at ACCUREC also water is recovered, which would lift the RE above these levels. Inter alia for reasons of comparability of processes this was *not considered* in the calculations.

Aachen, December 2012



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