

RESEARCH INTERNSHIP - MASTER

Academic year 2024-2025

Title	Quantification and characterization of sulfates present in over-sulfated recycled concrete aggregates
Description and Objectives	<p>As part of a deconstruction project involving several buildings in the Ile de France region, with a total surface area of approximately 35,000 m² scheduled for demolition, the project owner wanted to identify the optimal solutions for the management and recovery of the materials resulting from this deconstruction. The process of deconstruction of these buildings generated approximately 30,000 tons of waste, including 26,430 tons of concrete rubble (i.e. approximately 10,570 m³), of which nearly 90% of was classified as inert waste. In line with the sustainable development goals, the project owner aimed to adopt a circular economic approach by recycling materials from the deconstructed concrete elements for use in the site's future construction projects. However, a significant challenge arose due to the presence of the gypsum coating, which prevented the total reuse of the recycled concrete aggregate (RCA) in new concrete mixtures. More than half of cured concrete was found to have a sulfate content exceeding the limits set by standard the NF EN 206-1. This result highlights the importance of studying the risks associated with high sulfate levels in recycled materials. This case underscores the need to explore and better understand the risks of sulfate attack when using RCA with high sulfate concentration.</p> <p>The objective of this internship, carried out in collaboration with ESTP, IMT NORD EUROPE and ECOMINERO, is to establish a methodology for characterizing over-sulfated RCA. This research work aims to characterize a batch of RCA presenting sulfate levels with sulfates exceeding the standardized limits, by analyzing the quantity, quality and location of sulfates in the RCA. The study will focus on coarse aggregates extracted from demolished concrete contaminated by gypsum coming either from recycling platforms, storage platforms, or directly from demolition sites, in order to determine their potential for reuse in new concrete formulations.</p>
Required skills	Skills in materials sciences of Civil Engineering and construction, in physico-chemistry of construction materials, with preferably knowledge of cementitious materials. Taste for experimentation and interpersonal skills allowing him to work in a team.
Internship supervisors	Eliane Khoury (ESTP Paris) ekhoury@estp.fr Rachid Zentar (IMT NORD EUROPE) Nourhan Mortada (ECOMINERO)
Laboratories	The internship will take place on the ESTP sites in Cachan and IMT NORD EUROPE in Douai.
Duration	6 months from January/February 2025
Gratification	800 € net/month + reimbursement 65% transport tickets and restaurant tickets
Application file	<ul style="list-style-type: none"> - File to be sent by email to Eliane Khoury indicated above under the reference "ESTP IMT Ecominero internship" - Creation of the application file: CV, academic results and any other element likely to enhance your application