

Institute of Materials Science, Joining and Forming Kopernikusgasse 24/I, 8010 Graz

Announcement of a Master's Thesis, 04.10.2023 Experimental determination of the chloridethreshold for corrosion of rebars in concrete

Description

Rebars (reinforcing bars) in concrete are needed for to take over tensile stresses in buildings, bridges etc.. Reinforced concrete take up chlorides e.g. from salt spreading or from seaside atmosphere and diffuse to the rebar where enhanced corrosion starts (Fig. 1). The factors influencing the chloride-threshold are manyfold and depend on the passivation type of the rebar, the concrete composition, its water sorptivity and calcination degree, the addition of corrosion inhibitors and other.



Fig. 1: Chloride-induced corrosion mechanism of a steel rebar in concrete (Pillai, 2019).

Goal

To find an appropriate electrochemical setup and to determine the chloride threshold for certain conditions, including OCP (open circuit potential) tests in NaCl solutions, anodic polarisation resistance and accelerated chloride threshold (ACT) tests applying a voltage to increase the chloride diffusion through the concrete (mortar) cover. A relieable test could be e.g. the socalled Lollipop test (Fig. 2).



Fig. 2: Specimen geometry of the Lollipop test (Käthler et al. 2021).

Working packages

- Literature review on chloride-threshold (CT) determination and possibilities of electrochemical setups
- Manufacture of rebars-concrete samples & experimental CT determination for 3 different concrete compositions

Organisation

Supervisors: Dr. Rudolf Vallant, <u>rudolf.vallant@tugraz.at</u> / Dr. Isabel Galan Garcia, <u>igalangarcia@tugraz.at</u>
Duration: as of now for min. 6 months / Location: Münzgrabenstraße 36 / 3, 8010 Graz
Reward: € 2.500 + € 500 performance bonus for an excellent success

Further informationen

In cooperation with Institute of Applied Geoscience, TUG - For further information please contact the secretariat of the institute or the supervisor. Tel: +43 316 873 7181, office.imat@tugraz.at, http://imat.tugraz.at.