Geopolymers

Position

Cement&BetonCentrum is enthusiastic about all technological developments that could contribute to a further reduction of the environmental impact of the use of concrete. The active involvement of Cement&BetonCentrum members in the development of geopolymers as binder in concrete is a logical next step. The Netherlands is after all world leader in the use of low-clinker cements and the production of clinker in the Netherlands will end within a few years.

Geopolymer concrete could become an alternative for regular concrete for some applications, with a somewhat better environmental profile. Perhaps there are also applications for geopolymer concrete where regular concrete currently isn't used. Cement&BetonCentrum therefore promotes research on geopolymer concrete and assists in the development of regulations for the use of geopolymers in non-reinforced concrete.

However, Cement&BetonCentrum expects that, due to technical difficulties and a questionable improvement of the environmental impact of concrete, the use of geopolymer concrete will remain limited in the coming years. Furthermore, Cement&BetonCentrum is of the opinion that, from the point of view of circularity, CO_2 reduction, durability, concrete quality and occupational health and safety, it is undesirable that geopolymer concrete is used on a large scale before solutions are found for underneath aspects:

> The common raw materials for geopolymer concrete are slag and fly ash; these materials are already fully used in concrete and replace Portland cement clinker. The large scale use of geopolymer concrete will result in scarcity of these materials and thus in an increase in the use of Portland cement in regular concrete. Due to the CO_2 profile of the activators used in geopolymer concrete the net environmental result of the introduction of geopolymer concrete will then be negative. Therefore, it is necessary to guarantee that the slag and fly ash used for geopolymer concrete are from additional sources and not from the sources already used for cement and concrete production.
> There is a lot of uncertainty about the mechanical properties of geopolymer concrete and about the development of these properties in time. Also the protection of the reinforcement against corrosion is questionable. It is therefore advisable to limit the application of geopolymer concrete to non-reinforced concrete until the necessary knowledge and guarantees are available.
> The pH of the activators and the fresh geopolymer concrete is that high that it's dangerous for humans and the environment. Without proper precautions serious burning wounds can easily occur.
> The circular use of recycled geopolymer concrete aggregate in new concrete is difficult. The high alkaline content can, when used in concrete on basis of Portland cement in combination with reactive aggregates, result in ASR. Geopolymer concrete can therefore at the end of the service life only be used as foundation material or as a secondary aggregate in new geopolymer concrete. Measures must be put in place to guarantee this in order to prevent serious concrete damages.

March 2016