

GROUND GRANULATED BLAST FURNACE SLAG



WHAT IS GROUND GRANULATED BLAST FURNACE SLAG (GGBFS)?

Blast furnace slag (BFS) is a by-product of steel and iron manufacturing. When molten BFS is rapidly quenched with water, the slag becomes granulated. The granulated blast furnace slag (GBFS) is then ground to produce ground granulated blast furnace slag (GGBFS), which is a white powder. Calcium oxide, known as quick lime, silica and alumina dominate the chemical composition of GGBFS. These compounds, when ground to a powder and blended with water, offer pozzolanic properties, allowing the binding and strengthening of granular materials.

WHAT ARE THE BENEFITS OF USING GGBFS?

The benefits of using GGBFS in road and rail infrastructure are as follows:

- **Environmental benefits**
 - GGBFS is considered more environmentally friendly than Portland cement, as cement production requires natural materials and energy and generates a significant amount of CO². GGBFS, by contrast, is a by-product that requires processing by milling only.
- **Performance benefits when used in soil stabilisation**
 - Stabilising soils/subgrades using GGBFS as a cementitious binder and geopolymer binder results in a higher strength and durability compared to using Portland cement.
- **Performance benefits when used as a supplementary cementitious material**
 - The performance of GGBFS as a binder and supplementary cementitious material (SCM) has been shown to be equal to, or better in some instances, than Portland cement.

WHERE IS IT USED?

GGBFS is usually used as a SCM and/or a replacement for Portland cement. As such, GGBFS is used in the stabilisation of granular pavement materials and in-situ stabilisation of soft soils; manufacture of concrete and mortar/grout; and, more recently, in producing geopolymeric binders.

HOW MUCH CAN BE USED?

The AS/NZS 3582.2:2016 *Supplementary cementitious materials, Part 2: Slag - Ground granulated blast-furnace* specifies the requirements for GGBFS to be used as a cementitious material.

Different road agencies across Australia allow the use of GGBFS in various infrastructure applications and have specified requirements. Depending on the specifications, GGBFS can be used as a binder or an SCM in concrete, both common (up to 90% of the binder) and geopolymer (up to 100% of the precursor) concretes, and stabilisation works (up to 90% of the binder).

WHAT OPPORTUNITIES ARE THERE FOR IMPROVING ADOPTION?

GGBFS has been used as an SCM since the 1960s in Australia and, currently, is the most widely used SCM. GGBFS is commercially available and is considered a reliable SCM for the foreseeable future.

