

Ground Granulated Blast Furnace Slag

Ground Granulated Blast Furnace Slag (GGBS) is a blending material with hydraulic properties and used in concrete manufacturing.

Production of GGBS

The ground granulated blast furnace slag (GGBS) is extracted from the process of pig iron production, where the molten slag is quenched with cold water, producing glassy granulates. These granulates are dried and ground to a fineness suitable for concrete production.

Main Usage

GGBS can be used in massive foundation castings for lowering the heat of hydration and controlling the high temperature rise. GGBS has a low heat of hydration. GGBS is also used when sulphate resistance is needed. If the slag percentage is over 70% of binder, concrete can be considered as sulphate resistant also when it is not used with sulphate resistant cement. Concrete containing GGBS are also suitable for aggressive environments.

Advantages

There are several advantages in using cement / slag powder mix as binder in concrete:

- lowers the heat development of concrete and it is suitable for massive castings
- reduces the reduction of compressive strength when heat treatment is used
- reactions of slag powder continue a long time, high later strength can be reached
- improves the durability of concrete especially against sulphate attack
- also suitable for aggressive environment
- makes the colour of concrete lighter
- profitable binder
- by-product and therefore its use is environmentally beneficial.

Technical Properties

Replacing cement with GGBS lowers the early strengths in +20 °C. When total GGBS content from binder is less than 25% concrete will meet the same strength requirements in 28 days than the reference concrete. When 60-70% of binder is replaced with GGBS the strength will meet the reference concrete in 91 days.

Chemical Properties

CaO	36-42%
SiO ₂	36-40%
Al ₂ O ₃	8-10%
MgO	10-12%
S	1.5-2%
Ti	0.9-1.3%
K ₂ O	0.5-1.0%
Na ₂ O	0.5-1.0%

Technical Data

Colour	52-56% (ISO4270)
State	fine powder
Absolute density	2 900 kg/m ³
Bulk density	1 200 kg/m ³
Fineness (Blaine)	400 m ² /kg

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