



NANOVISION

Special Fillers

GGBS (Ground Granulated Blast-furnace Slag)



- Increased Durability
- Improved Workability
- Uniformity - Pumpability
- Thermal Mass Benefits
- Provides Superior Finish
- Environmental Benefits
- Albedo Effect Reduction
- Efflorescence Reduction
- Resistance to Chemical Attack

The chemical composition of the material offered by our company is as follows:

Chemical Composition (% on average)

SiO ₂	Al ₂ O ₃	Fe ₂ O ₃	CaO	MgO	TiO ₂	SO ₃	Cl-	S ²⁻	Na ₂ O	K ₂ O	Na ₂ O
37.7	10.2	0.6	43.8	6.4	0.7	0.1	0.02	0.7	0.21	0.28	0.37

Typical Physical Properties (Not for specification purposes)

Blaine specific surface area	4450 ± 250 cm ² /g
Indicative median diameter (d50)	11 µm
Sieve undersize (32 µm)	≥ 95%
True Density	2.90 ± 0.03 g/cm ³
Bulk Density	0.8 ± 0.1 g/cm ³
Colour index [CIE L*ab] with CR410	L* = 89.5 ± 2
Loss of ignition (950 °C)	< 1.5%
Water content (100 °C)	< 0.5%

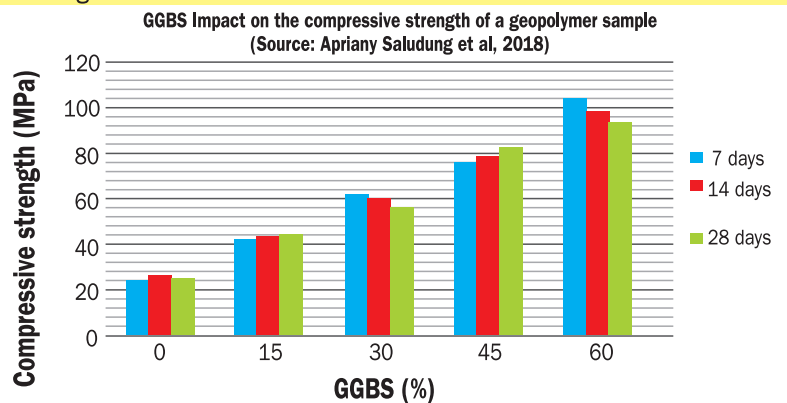
The combination of GGBS in the production of cementitious mortars and concrete provides important features during the application and the final result, such as:

- Ease of use: Makes mixing easier
- Resistance to compression forces of the application, especially at high temperatures
- Lower hydration temperature: Reduces the risk of thermal cracking
- Reduction of water permeability and porosity, improving the durability of cement
- Resistance to sulphides: Increases the life-duration of the building
- Chloride resistance: Helps reduce the solubility of residues, such as chlorides
- Protection against pH imbalance in cement construction
- White color: Reduces the requirement of pigment and creates a better aesthetic finish
- Final result: Fewer defects and smoother surface finish

GGBS material (granulated fly ash) is a calcareous fine powder with hydraulic and pozzolanic properties. It consists mainly of active calcium oxide (CaO), active silicon oxide (SiO₂) and aluminum oxide (Al₂O₃). The remaining part could contain iron oxide (Fe₂O₃) and other compounds.

The GGBS material is obtained by quenching molten iron slag (a by-product of iron and steel-making) from a blast furnace in water or steam. The final material is the granulated slag (GGBS) that comes from the boiler extinguishing while for the grinding process a granulator is used.

GGBS material is a high whiteness additive used in combination with Portland cement to produce superior quality concrete and other cementitious mortars. Its share in building mortar can reach - in weight - of up to 70%, according to I.S EN 206-1.



Benefits of GGBS in Concrete

Leachate Reduction

The pH of GGBS is lower than cement pH (10-11 compared to 13+ for cement). Thus GGBS, when mixed, lowers pH of the stabilised matrix, which results in reducing solubility of the contaminants and minimises leaching.

Lower Permeability

The higher silica and lower lime content in GGBS achieves a denser binder mixer formation, resulting in lower porosity and improvement of physical immobilisation of contaminants.

Increased Long-term Durability

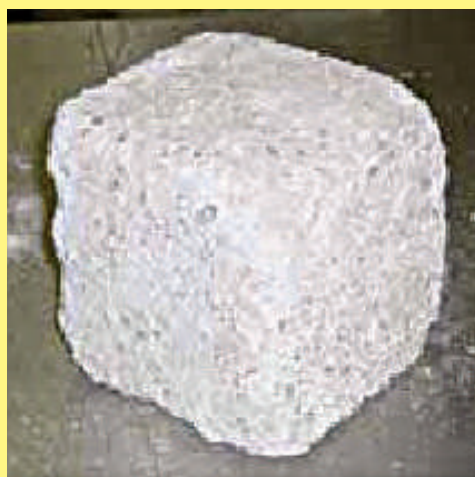
GGBS achieves higher long-term durability than regular Portland cement and extends the life-duration of project structures.

Resistance to Sulphates and Acids

GGBS replaces the use of sulphate-resistant Portland cement (SRPC) due to its excellent resistance to sulphates and acids. GGBS can be used in concrete for all categories of aggressive soil conditions listed in the BRE Special Digest 1: 2005 - Concrete in aggressive soil conditions.

Lower Environmental Impact

The carbon footprint of GGBS is just 42 kg of CO₂ per tonne, whereas ordinary Portland cement is over 850 kg CO₂ per tonne. GGBS is the only product to have a third party verified Environmental Product Declaration.



0% GGBS



30% GGBS



50% GGBS

Efflorescence Reduction

Efflorescence, or the staining of concrete surfaces by calcium carbonate deposits, is one of the most persistent, insidious problems affecting concrete appearance. GGBS is effective in preventing efflorescence when used at a replacement level of 50-60%. GGBS gives the result of a denser, much less porous concrete.

Albedo Effect

Albedo is the percentage of incoming radiation reflected off a surface. Using GGBS will lead to a lighter more reflective surface greatly increasing the reflection of incoming radiation and a reduction in global warming.

Reduce Heat Island Effect

Solar radiation is reflected by lighter coloured surfaces.

You can regularly find GGBS in construction of:

- Water power stations
- Seawalls
- Tidal barrages
- River dams
- Mega buildings
- Special buildings foundations

