



Ground Granulated Blast Furnace Slag (Slag)



Ground Granulated blast-furnace slag powder is a fine white powder used in concrete. Slag is produced in iron and steel manufacturing process as a by-product. Molten slag is extracted from iron ore at elevated temperature (approximately around 1500°C) and rapidly water quenched to obtain reactive granular slag particles. The granular blast furnace slag is then dried and milled with optimized quantities of gypsum in Vertical Roller Miller (VRM) to cement fineness. The product is manufactured by Independent Cement at their Yarraville grinding facility.

Currently slag is most widely used in concrete as a separate supplementary cementitious material or as part of a blended cement. Ground Granulated Blast Furnace Slag complies with Australian Standard AS 3582.2-2001- Supplementary cementitious materials for use with Portland cement.

TYPICAL CHARACTERISTICS OF SLAG

Property	Requirements of AS3582.2	Typical result (%)
Loss on ignition	NA	≤1
Sulfide Sulphur	Max 1.5%	≤1
Magnesia	Max 15%	4-7
Alumina	Max 18%	12-15
Total Iron	NA	≤1
45µm residue	NA	≤5

SETTING TIME

Concrete containing slag has slightly extended setting time (by up to 40 minutes) when compared to concrete produced with General Purpose cement only (GP). However, the setting of concrete is greatly affected by other factors like water to cement ratio, temperature, admixtures.

APPEARANCE

Concrete containing slag will lighten the colour of fully hardened, cured concrete. Lighter colour in concrete is generally considered as a positive benefit as it improves the aesthetic look and reflectivity of concrete.

SLAG IS USED VIRTUALLY ALL CONCRETE APPLICATIONS

- Concrete pavements
- Concrete structures and foundations
- Mass concrete applications, such as dams, windfarm base or retaining walls
- Precast and prestressed concrete
- Concrete pipes and blocks
- Concrete exposed to harsh environments, such as wastes water treatment and marine application
- High-performance/high-strength concrete, such as high-rise structures or 100-year service life bridges

THE BENEFITS OF USING SLAG IN CONCRETE

The use of slag in concrete has demonstrated long term performance enhancement and improved durability.

- Slag in concrete generally improves workability, finishability and pumpability of plastic concrete. It may also reduce the water demand of concrete.
- Slag can form additional reaction products to reduce the pore size of the concrete thereby permeability of concrete. Low permeability prevents the ingress of aggressive substances into concrete or level of rebar.

- When slag is incorporated in a concrete mixture, less heat is generated, and thermal stress is reduced. Slag blended products are often specified for mass concrete production.

DIRECTION TO USE

The amount of slag is added to a concrete mixture, as a percentage of total cementitious material by weight, normally ranges from 10 to 70 percent. The amount of slag for specific project depends on several factors including the application, early and later age strength requirements, durability requirements and ambient temperature to name a few.

HANDLING AND STORAGE

Manual handling of bag products or bulk materials without due care and attention may result in personal injury. It is recommended to use personal protective equipment (PPE) and precautions as suggested in safety data sheet.

SAFETY INFORMATION

For safety information refer to the safety data sheet (SDS) for ground granulated blast furnace slag.

AVAILABILITY

Independent cement slag is available as bulk and bag product.

