

Summary of Indian Standard

IS 455: 2015 Portland Slag Cement – Specification *(fifth revision)*

'Portland Slag Cement', commonly known as **Slag Cement** is one of the hydraulic cement largely used in the construction of buildings and structures. Granulated slag (a by-product of iron manufacturing) that is non-metallic and has silicates and alumino-silicates of lime (both of which have good cementing properties) is ground with cement clinker to make Slag Cement. Ordinary **Portland Cement** (OPC) uses over **95% cement clinker** obtained from limestone mined from earth, while **Slag Cement** uses anywhere between **30% to 65%**. This way Slag Cement addresses the **sustainable** use of earth's limestone reserves and consumes slag, an industrial by-product, thereby making it a suitable choice for **green building** construction.

The quality parameters expected for OPC are applicable for Slag Cement, namely, the **initial setting time**, which gives enough opportunity to make a cement sand mortar mix to apply in brickwork, plastering, etc; and the **final setting time**, which ensures the cement hardens and stabilizes the masonry wall or plaster for further work. A good cement should not change in volume during this setting and hardening process (known as **soundness**) and is essential for durability; while unsound cement can crack and affect a building's quality. The **28-day strength**, a key requirement provides confidence for the use of manufactured cement in brick-work, concrete, etc. Apart from general concreting works, cement concrete made using slag cement is best suited in **soils having high chlorides and sulphates** both of which have harmful effects like corrosion of steel inside the concrete, cracking of concrete due to expansion, loss of strength, etc.

The fifth revision of the standard, IS 455 lays down the **chemical** requirements, **physical** requirements and the **manufacturing** guidelines of Portland Slag Cement.

Slag cement manufacture uses raw materials like granulated slag (as per IS 12089), ground granulated blast furnace slag (as per IS 16714), Portland cement clinker (as per IS 16353) and is obtained by either of the **two** methods, namely:

Intergrinding method – By intimately grinding cement clinker and granulated slag

Interblending method – By uniformly blending ordinary Portland cement (as per IS 269) and finely ground granulated slag

In both the above methods **gypsum** is also added in the manufacture so as to prevent flash setting of cement when mixed with water during final use.

The chemical requirements to be satisfied by the ground cement include insoluble residue, magnesia, anhydric sulphates (SO₃), loss on ignition, and chloride, when tested as per IS 4032. These requirements are a way to **ensure proper calcination** of the cement-making materials has happened and **inert materials** are not introduced in the cement.

The physical requirements, such as fineness, soundness, setting time, compressive strength, and transverse strength, to be evaluated as per IS 4031 address every performance and durability requirement expected by the end user.

Apart from the usual **50 kg cement bags**, IS 455 provides requirements of packing of slag cement in durable bags having capacities such as 25 kg, 10 kg, 5 kg, 2 kg and 1 kg with their respective weight tolerance.

IS 455 spells out the marking requirements for the cement bag (using a unique colour) to distinguish slag cement from other types of cement. The **best-before date** suggested in the standard is to guide users to consume the cement within the time (of 3 months) in projects/works. A guide to storing cement for longer periods before use is also covered.

For specific guidance on the use of slag cement in soils having chlorides and sulphates reference is solicited to the **concrete code**, IS 456: 2000 'Plain and reinforced concrete—Code of practice (*fourth revision*)'.

The **Cement (Quality Control) Order, 2003** ensures that all the Cement standards (including IS 455) are under **mandatory** BIS certification which aims to provide quality products to the consumers.
