

CONCRETE CHATS

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Portland Cement

Portland cement is arguably the most critical component of concrete mixtures. Without cement you are left with sand, rock, and water soup that won't do much for you. Patented in England in 1824, Portland cement is made by grinding limestone, clays and other materials and heating the mixture to about 1450 °C, resulting in an intermediate product called clinker. Clinker is further ground together with performance additives to produce cement in powder form. Portland cement is highly reactive with water allowing it to set up and gain strength very quickly, typically 28 days. Portland cement is covered by ASTM C150 with Types listed below.

Type I/II: Initially separate materials (Type I, General Use, and Type II, Moderate Sulfate Resistance), Type I/II cement is a general-purpose material with moderate sulfate resistance capability replacing Type I cement in most applications several years ago.

Type III: Known as High-Early cement, Type III is a finer ground material than Type I/II which provides larger surface area to react with water achieving higher strength in a shorter period. Type III cement is not commonly used due to higher costs in production and limited practicality for "normal" use where fast strength gain is not required. Similar results can be obtained with the use of admixtures and Type I/II cement which further reduces the need for Type III material

Type IV: A Low Heat of Hydration material, Type IV cement helps control the hydraulic reaction in applications, particularly mass concrete, where excessive heat gain leads to thermal cracking and other challenges as concrete sets. Type IV cement is rarely used as it has very little practical benefit outside of applications mentioned above. Currently heat of hydration is better controlled with Supplementary Cementitious Materials (SCMs) and mechanical cooling practices during construction.

Type V: A material with high sulfate resistance, Type V is often combined with Type II, forming a Type II/V cement, for general use in areas where significant sulfate attack on concrete is a primary consideration.

High and typically consistent performance in concrete has made Portland cement an indispensable element in construction for over 200 years. However, cement production comes with high carbon footprint as CO₂ is separated from limestone during heating and large amounts of fossil fuels are frequently burned to reach the required temperatures. Blended cement, to be covered in the next installment, is one tool for carbon footprint reduction..

QuicTip▶ [Products - BoMetals Inc.](#) products are suitable for use in all concrete mixtures regardless of the cement component. For additional information [contact-us](#).

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