Method of producing fast-setting composite Portland cement includes mixing ground Portland cement clinker, gypsum, blast furnace granulated slag and chalk with a pre-prepared aqueous solution of a carboxylate-type superplasticizer. The cement components are obtained by pre-grinding Portland cement clinker to a specific surface area of 450±20 m^2/kg according to Blaine. Pre-ground clinker, gypsum, blast furnace granulated slag, and chalk are mixed in an amount of 10-20% by weight of Portland cement. Water is heated to a temperature of ≥35 °C, a carboxylate superplasticizer is added in an amount of 0.0002-0.0016 % by weight of cement and stirred for at least 60 seconds until dissolved. The prepared aqueous solution is mixed with the cement components and mixed until a dough of normal density is obtained.