

SUPPLEMENTARY CEMENTITIOUS MATERIALS

Introduction

Concrete is a mixture of natural sand and stone that is glued together with portland cement, supplementary cementitious materials, water, and admixtures. You can expect some variations in surface and performance because concrete is mostly made of natural materials. Concrete can provide long-term durability and value when you use quality materials, and place, cure and maintain it properly.

The purpose of this document is to give more information about supplementary cementitious materials (SCMs).

The two most common materials used throughout Minnesota are fly ash and slag cement. Silica fume is also used for specialty concrete. Less common SCMs are natural pozzolans and metakaolin, and other new options are currently being explored. Fly ash, slag cement, and silica fume are discussed below.

Overview

SCMs are used in conjunction with portland cement to enhance the properties of concrete as it's fresh and once it's hard. Their use can make concrete easier to work with, stronger and more durable.

Most SCMs are recycled materials from other industries, although they must meet standard specifications, which, along with company quality control programs, ensure that the materials are acceptable for use in concrete.

SCMs are not inert or fillers. They work in conjunction with cement to continue the chemical reactions caused by mixing cement and water and produce a denser microstructure in the concrete. They help mitigate heat production in mass concrete structures, too.

SCMs may be added separately to the concrete at the ready mix concrete plant or come pre-blended before arriving at the concrete production facility. It is becoming common to use three or even four cementitious materials in ready mix concrete.

Fly ash:

Fly ash is a non-combustible, fine material that is captured from flue gases before they reach the chimneys of coal-fired power plants. Fly ash is governed by ASTM C618, "Standard Specification for Coal Fly ash and Raw or Calcined Natural Pozzolan for Use in Concrete."

Slag Cement - Ground Granulated Blast Furnace Slag (GGBFS):

When steel is produced from iron ore in a blast furnace, a non-metallic liquid material floats on the iron. The liquid is rapidly cooled and ground into a fine powder like cement. Slag cement is governed by ASTM C989, "Standard Specification for Slag Cement for Use in Concrete and Mortars."

Silica Fume:

Silica fume is an ultrafine powder that is a byproduct of silicon metal and ferrosilicon alloy production. Silica fume is governed by ASTM C1240, "Standard Specification for Silica Fume Used in Cementitious Mixtures."

Please contact your contractor and concrete producer for the most suitable materials and methods for your application.

For more information, call your local concrete contractor, ready mix producer or

www.chooseconcrete.com.

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