

ITEM 09555.01 M - CONCRETE FOR STRUCTURES, CLASS DP

DESCRIPTION. This work shall consist of furnishing and placing Class DP concrete for structures.

MATERIALS. All the material requirements of §555-2 shall apply with the following additions:

A microsilica admixture shall be supplied in slurry form or as a densified powder, added either independently or as part of a blended cement. The Producer shall provide the Regional Materials Engineer with a minimum sample of one quart of microsilica directly from a storage container, for each days placement of Class DP concrete, for testing by the Department. This sample shall be obtained in the presence of a Department representative.

If the microsilica is to be added independently, it shall be one appearing on the Department's Approved List. Only one brand shall be allowed for any structural element. The Manufacturer shall provide written certification for each shipment supplied that the supplied material meets the requirements of the procedural directives of the Materials Bureau. This certification shall list fineness, silica content, total chloride ion content, solids content for slurries, and moisture content for densified powders.

If the microsilica admixture is supplied in the slurry form it shall be maintained in storage above the temperature of 0°C. Slurries exposed to temperatures of 0°C or less shall be removed and replaced at no cost to the Department. The slurry shall be homogeneous and agitated as necessary to prevent separation.

If the microsilica admixture is supplied as a densified powder as part of a blended cement, the blended cement shall meet the requirements of Item 701-03 - BLENDED PORTLAND CEMENT, and shall appear on the Departments Approved List.

Item 711-12- GROUND GRANULATED BLAST FURNACE SLAG (GGBFS) may be substituted, in total, for fly ash and shall appear on the Departments Approved List.

Class DP concrete shall consist of a homogeneous mixture of cement, fly ash, microsilica admixture, fine aggregate, coarse aggregate, air entraining agent, set retarding water reducer and/or water reducing admixture and water. In addition, Class DP concrete for superstructure slabs and structural approach slabs must contain a set retarding water reducing admixture as per §555-2.02. Class DP concrete shall meet the requirements of TABLE 1- MIX CRITERIA given below.

TABLE 1 - MIX CRITERIA

Cement content (kg/m ³)	318
Fly ash content (kg/m ³)	86
Sand percent total aggregate (solid volume)	45.8
Designed water/total cementitious content	0.40
Desired air content (%)	7.5
Allowable air content (%)	6.0 - 9.0

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Desired slump (mm)	100
Allowable slump (mm)	75-125
Type of coarse aggregate gradation	CA1

NOTE The criteria are given for design information and the data is based on a fine aggregate fineness modulus of 2.80. The mixture proportions shall be determined using actual conditions for fineness modulus and bulk specific gravities (saturated surface dry for aggregate). The proportions shall be computed according to Department written instructions.

CONSTRUCTION DETAILS. All the provisions of §555-3 shall apply as modified herein.

Microsilica admixture addition shall be as follows:

1. **If a microsilica slurry is used** - Batch cement and fly ash independently of the microsilica slurry. The tolerance for cement and fly ash draw weights shall be based upon the total weight of cement plus fly ash, and shall be $\pm 1\%$ by weight. The slurry shall be added using proportioning equipment approved by the Regional Materials Engineer. The microsilica slurry admixture shall be added either through an existing automation system or a two stop off-line automated batching system. The automated batching system shall meet the following requirements:

- Meter accuracy of $\pm 1\%$ (by volume)
- Program quantity (liters, nearest half liter)
- Batching tolerance $\pm 2.0\%$ (by volume)
- System interlocks
- Print requirements:
 - a. Date and time
 - b. Truck number (or alternate method relating microsilica to batch ticket)
 - c. Delivered quantity (liters, nearest half liter)

The control box/printer for a two stop off-line batching system shall be located at the batch plant operator's work station unless otherwise approved by the Regional Materials Engineer.

Calibration shall be in accordance with the procedures approved by the Regional Materials Engineer. Whenever any part or all of the off-line system is moved the entire system shall be recalibrated.

2. **If a densified powder is used and added independently** - The densified powder shall be weighed cumulatively with the cement and fly ash. The densified powder shall be last in the weighing sequence and the tolerance for each material draw weight shall be based upon the total weight of cement plus fly ash plus densified powder. The batching tolerance for the cement plus fly ash plus densified powder shall be $\pm 1/2\%$ by weight.
3. **If a densified powder is used as part of a blended cement** - The blended cement shall be weighed cumulatively with the fly ash. The blended cement shall be first in the weighing sequence and the tolerance for each material draw weight shall be based upon the total weight of blended cement plus fly ash. The batching tolerance for the blended cement plus fly ash shall be $\pm 1\%$ by weight.

METHOD OF MEASUREMENT. All the provisions of §555-4 shall apply.

BASIS OF PAYMENT. All the provisions of §555-5 shall apply.

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Payment will be made under:

Item No.	Item	Pay Unit
09555.01M	Concrete for Structures, Class DP	Cubic Meter