



TO: SUPERSEDED BY EB 97-020 EFFECTIVE 4/4/97	 <h2 style="text-align: center;">ENGINEERING INSTRUCTION</h2> <p style="text-align: center;">NEW YORK STATE DEPARTMENT OF TRANSPORTATION</p>
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APPROVED:  <hr/> A. M. Skirole, Deputy Chief Engr., Structures	Date: 5/12/92 Supersedes: EI 91-7

This Engineering Instruction transmits changes to Section 584 of the Standard Specifications of January 2, 1990. These changes include those previously issued under EI 91-7 along with the following revisions:

1. The mix design parameters for Microsilica Concrete (MSC) have been changed. These changes include a reduction in both the microsilica and cement contents. This should help to reduce the potential for shrinkage cracking, and improve the workability and finishing characteristics of the MSC, without sacrificing the low permeability characteristics of the MSC.

2. The requirement for laboratory test batches has been eliminated. There is no need to continue this since we have never identified problems with different material combinations in MSC and foresee no problems in the future.

For contracts let on or after July 30, 1992 (PS&E May 7, 1992) the revised specification will be in effect.

Make the following changes to the Standard Specifications of January 2, 1990.

Page 5-107

Delete §584-2.01F and replace with the following:

"F. Microsilica Admixture. The microsilica admixture shall be supplied in either a densified powder or slurry form. The slurry shall be homogeneous and agitated as necessary to prevent separation. When tested, the microsilica shall meet the procedural directives of the Materials Bureau. The microsilica admixture shall be accepted at the work site provided it meets all of the following requirements:

1. It shall be one of the products on the Department's Approved List. Only one brand shall be supplied.
2. Manufacturer's written certification that the material supplied is identical in composition to that prequalified in accordance with the procedural directives of the Materials Bureau. This certification shall also list fineness, silica content, total chloride ion content, solids content for slurries, and moisture content for densified powders, for the shipment supplied.

The microsilica slurry admixture shall be maintained in storage above the temperature of 32°F. Slurries exposed to temperatures of 32°F or lower shall be removed and replaced at no cost to the Department.

Field samples, for testing by the Department, will be taken. Refer to the CONSTRUCTION DETAILS, §584-3.09C1."

Pages 5-108

Under §584-2.02 #1 Note 4, delete "6.0" and replace with "6.5".

Under §584-2.02 #2, in the Table under "Desired Air Content", delete "6.0" and replace with "6.5".

Under §584-2.02 #4, delete the last paragraph and replace with the following:

"The fine and coarse aggregate and all bulk cement shall be placed in Department approved bags. The admixtures shall be placed in Department approved, one quart containers."

Page 5-109

Delete §584-2.04 and replace with the following:

"584-2.04 Manufacture of Microsilica Concrete. Microsilica concrete shall consist of a homogeneous mixture of cement, fine aggregate, coarse aggregate, microsilica admixture, high range water reducing admixture, air entraining agent and water which meets the requirements of the MIX CRITERIA TABLE given in this subsection.

The actual proportions of aggregates will be determined by the Department based upon aggregate properties. The Contractor shall inform the Engineer, in writing, of the sources of coarse and fine aggregate. This notification shall be given at least ten (10) working days prior to concrete placement.

The Contractor shall inform the Engineer, in writing, of which brand of microsilica is to be used. Notification shall be given at least ten (10) working days prior to concrete placement.

MIX CRITERIA (a)

Cement content (lbs./c.y.)	658
Sand content (% total aggregate by volume)	53.0
Microsilica Admixture (lbs./c.y.)	60
Desired air content (%)	6.5
Allowable air content range (%)	5.0-8.0
Water (lbs./c.y.) (b)	263
Desired slump (inches) (c,d)	6
Allowable slump range (inches) (c,d)	5-8

NOTE (a) The criteria are given for design information and the data is based on a fine aggregate modulus of 2.80 and a CA1 coarse aggregate gradation. The mixture proportions shall be determined using actual conditions for fineness modulus and bulk specific gravities (saturated surface dry for aggregates). The proportions shall be computed according to Department written instructions.

NOTE (b) This is the total quantity of mix water required. This total quantity shall be added at the batch plant. If a microsilica slurry is used, the slurry water shall be included in the calculations as mix water. The free moisture content of both the fine and coarse aggregates shall be included in the calculation as mix water. Retempering with water shall not be allowed.

NOTE (c) A high range water reducing admixture shall be added to provide slump within the allowable range. It shall be added at the project site, using a method approved by the Regional Materials Engineer. The Regional Materials Engineer may permit the addition of high range water reducing admixture at the concrete batching facility to assist mixing. Additions of admixture at the work site shall not exceed two in number and the total quantity from all additions shall not exceed the manufacturer's maximum dosage rate. Each time the admixture is added at the work site, the concrete shall be mixed an additional minimum of 30 revolutions. Upon successful trials, as exhibited by consistent slump and air content results, the Regional Materials Engineer may allow the high range water reducing admixture to be added at the concrete batching facility. Regardless of where the high range water reducing admixture is added, the total number of revolutions shall not exceed 160.

NOTE (d) When using a mobile mixer, the concrete for the slump test shall be deposited in a clean container and allowed to stand without disturbance for 5 minutes prior to performing the slump test.

Page 5-110

Under §584-2.05C3, delete this paragraph and replace with the following:

"Microsilica concrete shall be produced in either one of the following: a mobile mixing unit, provided proper modifications are made to dispense the microsilica, and these modifications are approved by the Director, Materials Bureau; or, a concrete batch plant. If a mobile mixing unit is approved for use, the requirements of §584-2.05C1 shall apply. If a concrete batch plant is used, the requirements of Section 501 shall apply, except as modified herein.

When a concrete batch plant is used to supply the microsilica concrete, and a microsilica densified powder is used, the densified powder shall be weighed cumulatively with the cement. 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 densified powder. The batching tolerance for the cement plus densified powder shall be $\pm 1/2\%$ by weight.

When a microsilica slurry is used, the slurry shall be added prior to the initiation of the batching sequence using proportioning equipment approved and calibrated by the Regional Materials Engineer. The batching tolerance of the slurry shall be $\pm 2\%$ by weight.

Under §584-2.05D3 in the Table, change the tolerance of the Microsilica Admixture to $\pm 2\%$.

Page 5-115

Under §584-3.09C1 in the last line, delete "shipment" and replace with "day's placement".

Page 5-116

Under §584-3.09F, delete #2 in its entirety and replace with the following:

"2. The concrete shall be consolidated by internal vibration in accordance with §555-3.04B."

Page 5-118

Under §584-3.14B, delete #1a in its entirety and replace with the following:

"a. Temperature limits shall be maintained for 168 curing hours."