SCOPE
This procedure describes the sampling and testing of Microsilica (§711-11) admixture used in the production of Classes DP, HP and Microsilica Overlay Concrete for Department projects.

BACKGROUND
Microsilica is a supplementary cementitious material or admixture that increases strength and reduces permeability in High Performance and other concrete mixtures. Microsilica is highly pozzolanic, which means that high levels of reactive oxides (ie. silica, aluminum or ferrous oxide), react with calcium hydroxide in the portland cement to increase strength and form a denser paste. Silica fume is the most common microsilica and is currently available as a densified powder or a slurry. Other powder products, such as metakaolin and rice hull ash, also appear on the Department’s Approved List of Materials as a Microsilica admixture.

All of these products are typically pH neutral (pH 6.0-8.0), and must meet the chemical and physical requirements of §711-11. In order to assure their quality, routine monitor sampling and testing will be performed at the point of use. The concrete batching facility is typically the point of use, and is generally the source of contamination from other products such as portland cement.

SAMPLING
Refer to §584-2.01 B and §501-2.03 B of the Standard Specifications.
A sample of the Microsilica will be taken by or witnessed by a Department Representative (Inspector).
Microsilica from an approved supplier must be accompanied by written certification stating that the material supplied meets the requirements of §711-11 of the Standard Specifications, and/or AASHTO M307. As of July 10, 2001, the producers of microsilica agreed that the certification will also include the pH level of the material being supplied.

A. SLURRY.
BATCH OR CENTRAL MIX PLANT - Take the sample directly from the storage container at the plant. Allow approximately 12 liters (3 gallons) to flow out before taking the actual sample. This initial quantity may be placed directly back into the storage container. Place the actual sample directly into a clean, dry, 1 liter (1 quart) plastic jar. Obtain one sample for each day of production of either Class DP, HP or Microsilica overlay concrete. If a storage tank is recharged during a day’s production, obtain another 1 liter sample.

MOBILE MIXER - Take the sample directly from the bypass valve in the microsilica feed line. Allow approximately 4 liters (1 gallon) to flow out before the actual sample is obtained. This initial quantity may be placed directly back into the storage container.
Place the actual sample directly into a clean, dry, 1 liter (1 quart) plastic jar. Obtain one sample for each day of production of either Class DP, HP or Microsilica overlay concrete. If a mobile mixer storage container is recharged during a day’s production, obtain another 1 liter sample. Any mobile mixer that is not equipped with a microsilica line bypass valve should not be used.

B. POWDER.

Obtain the sample directly from the tanker prior to charging the microsilica bin. If the delivery was made when the Inspector was unavailable, the Producer shall direct the Inspector to the approved sampling location (as per §501-2.03 B.) for the bin that was charged. The bin may not be used for Department projects until the sampling location is safe and free from contamination, as determined by the Inspector. Any evidence of caking (or hardening) of microsilica in either the tanker’s discharge lines, or the facility’s supply lines or storage bin, is an indication of contamination or physical deficiencies in the handling of the product. The caking may be caused by; moisture in the lines or the bin; residual contaminates from another product (such as portland cement) in the system, too many metallic connections in the tanker’s discharge or the facility’s supply lines; the presence of a “deflection box” on the facility’s bin supply system. These deficiencies have been known to allow unmixed microsilica “chunks” to appear in structural concrete.

Place the sample directly into a clean, dry, 1 liter (1 quart) plastic jar. Obtain one sample for each day of production of either Class DP, HP or Microsilica overlay concrete. If a storage tank is recharged during a day’s production, obtain another 1 liter sample.

PROCEDURE FOR ON-SITE PURITY TESTING OF MICROSILICA

EQUIPMENT:

Wide Range pH test paper, a clean 120 ml (4 fluid oz.) paper cup (or equivalent sized vial), potable water.

TESTING:

- Use the test paper to pretest the water for alkalinity/acidity. Place approximately 30 ml (1 fluid oz.) of the water in the paper cup or vial. Dip the pH test paper into the water. Any color change (generally red if acidic or green if alkaline) signifies unsuitable water for testing.
- Using suitable water, place approximately 0.5 grams of the microsilica sample into the paper cup with the test water and gently agitate.
- Dip another pH test paper into the microsilica/water solution. Look for any color change on the test paper. A blue-green or green color (pH of greater than 9) may signify alkaline contamination that is most likely attributable to either portland cement or Ground Granulated Blast Furnace Slag (GGBFS) intermixed with the microsilica. This contamination may be limited to the immediate sampling area, or it may represent contamination of the entire bin. Compare the measured pH with the certification for the shipment. If the measured pH falls within ± 1 of the certified pH level from the manufacturer, the sample is not contaminated.

- If the sample is contaminated, the Inspector may:
  1. Allow the Producer to run additional material from the bin, in an effort to obtain another sample that may be more representative of the bin contents.
  2. Deny production of any mixes that require microsilica until the bin is proven to be uncontaminated.
  3. Inform the Producer that, if the Materials Bureau determines that the sample does not meet the Physical and Chemical requirements of Item §711- 11, the contents of the bin is subject to rejection.
ACTION:
For further testing by the Materials Bureau; Retain one reference sample for each 3 days of production per structure, with a minimum of one sample per structure and/or shipment of microsilica. Print the following information on the sample container with an indelible marker: Manufacturer of microsilica, Contract number, Date/time sampled, Facility Number/Concrete Mobile Number. If the sample submitted has been tested for purity using the pH test kit; write “pH tested” in Box 16 of the BR 240 transmittal form. Send the sample to the Materials Bureau for testing. Accompany the sample with a properly completed BR240 transmittal form. Do not allow slurry samples to be exposed to extreme temperatures (below 0°C (32°F) or above 30°C (85°F)).

REPORTING:
After testing, the Materials Bureau will produce a “TEST ACTION TRANSMITTAL, NYSDOT MATERIALS BUREAU” with the appropriate action (accept or reject) indicated. This transmittal will be sent to the Regional Materials Engineer or Testing Agency. Distribute the transmittal as follows:
1. Original transmittal copy to project Engineer-in-Charge.
2. Copy of transmittal to Regional Materials Engineer or Testing Agency.