

August 25, 2000

DRI-CAL™ PARTICLE SIZE STANDARDS
NIST Traceable Mean Diameter

1. DESCRIPTION DRI-CAL™ Particle Size Standards are designed for calibrating particle analyzers which require dry microspheres. The products are conveniently packaged in dropper-tipped bottles to enable dispensing the microspheres directly into the sampling chamber. Their mean diameters are traceable to the National Institute of Standards and Technology (NIST). Other data is for information only and should not be used as calibration values.

Note: These products are not suitable for dispersion in liquid media.

2. PHYSICAL DATA

Certified Mean Diameter:	Catalog Number: DC-25, Nominal 25µm
Standard Deviation:	25.2µm ± 1.0µm
Coefficient of Variation:	2.5µm
Microsphere Composition:	9.9%
Polymer Density:	Polystyrene Divinylbenzene (4-8%)
Index of Refraction:	1.05 g/cm ³
Approximate Number:	1.59 @ 589 nm
	1.1 x 10 ⁸ per gram

-Continued on page 2**VALUABLE CERTIFICATE – KEEP ON FILE****CERTIFICATE OF CALIBRATION AND TRACEABILITY**

This certifies that the calibrated mean diameter dimension of this product was transferred by optical microscopy from a stage micrometer calibrated by the National Institute of Standards and Technology (Calibration Report #5524). NIST Standard Reference Materials 1690, 1692, 1960, and 1961 were used to validate the accuracy and traceability of the calibration methods.

Catalog Number: DC-25, DRI-CAL™ Particle Size Standards	
Certified Mean Diameter: 25.2µm	Material Batch: DC-25-002
Uncertainty: ± 1.0µm	Certification Date: October 3, 1997



Philip L. Warren, President
Duke Scientific Corporation

*Void without seal*Packaging Lot #: **32019**Expiration Date: **JUL '10**

3. MEASUREMENT METHODOLOGY The certified diameter of this product was transferred by optical microscopy from a NIST calibrated stage micrometer, a glass slide engraved with a 2 millimeter scale with 200 lines. The exact line spacing was calibrated by NIST in micrometers. The uncertainty is the sum of the calibration transfer uncertainty and the random error of the measurements. To validate the accuracy of our optical methods, NIST certified microsphere standards were measured by the same method. The size distribution (standard deviation) was obtained by optical microscopy or electrical resistance analysis. The Coefficient of Variation is the standard deviation as a percentage of the mean diameter.

4. CERTIFICATE Except for the purposes of record keeping, this certificate may not be reproduced. Rebottling or relabeling invalidates the certification and traceability of these products.

5. OPERATING INSTRUCTIONS For ease of use, the microspheres are packaged dry, in a dropper-tipped bottle. They must be thoroughly dispersed to assure statistically consistent samples. To disperse the particles, gently roll or invert the bottle several times. Do not shake the bottle as this will introduce static which will interfere with the dispersion. Before using, be sure no clumps are visible inside the bottle. Dispense immediately after dispersion using the dropper tip, or remove the tip and use a microspatula. Clean all sampling implements before inserting into the bottle to prevent contamination of the contents. Repeated sampling from the dropper tip may cause statistical variation over time. These products are not suitable for dispersion in aqueous media.

6. SAFETY AND HANDLING PRECAUTIONS Avoid aerosol production in the workplace or wear a suitable filter respirator. Avoid inhalation or ingestion of the particles. These products should only be used by trained scientific personnel. A Material Safety Data Sheet is included with each package.

7. STORAGE AND DISPOSAL Keep the bottle tightly sealed to avoid contamination. Store at room temperature. Each bottle has a limited shelf life and should not be used after its expiration date. In case of spills, wash or wipe the area thoroughly. Surfaces covered with dry microspheres may be slippery. Dispose of any waste residue according to prescribed federal, state, and local guidelines.

8. LIMITED WARRANTY These products are intended for general laboratory use by trained scientific personnel. Determination of their suitability for specific end uses is the responsibility of the user, who assumes liability for loss or damage arising out of the use of the product. Duke Scientific Corporation's warranty is limited to replacement of defective products if returned with our authorization within 60 days of purchase date.