thermo
scientific

July 2, 2009

DUKE STANDARDS™
Soda Lime Glass Microspheres
NIST Traceable Mean Diameter

1. DESCRIPTION These particle size standards provide accurate and traceable size calibration values for particle size analysis. They are part of a series of uniform glass microspheres with calibrated mean diameters traceable to the Standard Meter through the National Institute of Standards and Technology (NIST). Uniform glass microspheres are widely used as calibrants and controls for instruments requiring a higher density than polymer microspheres. Made of borosilicate or soda lime glass, diameters from 2 to 2000 micrometers (µm) are available as dry spheres, calibrated by optical microscopy. Other values are for information only and should not be used as calibration values.

2. PHYSICAL DATA	Catalog Number: 9550, Nominal 550 µm
Certified Mean Diameter:	553 µm ± 11 µm, k=2
Standard Deviation:	29.0 µm
Coefficient of Variation:	5.2%
Microsphere Composition:	Soda Lime Glass
Microsphere Density:	2.59 g/cm^3
Index of Refraction:	1.52 @ 589 nm
Dielectric Constant:	7.3 @ 1 MHz and 20 °C
Approximate Number:	4360 per gram

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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: 9550, Duke Standards™ Soda Lime Glass Microspheres

Material Batch:	9550-001
Certification Date:	July 1, 2009
Certified Mean Diameter:	553 µm
Uncertainty:	± 11 µm, k=2

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Packaging Lot # 275838 Expiration Date: JAN'27

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3. MEASUREMENT METHODOLOGY The certified diameter of this product was obtained by optical microscopy from a NIST calibrated stage micrometer, a glass slide engraved with scale. The exact line spacing was calibrated by NIST in micrometers. The uncertainty is calculated from the calibration transfer uncertainty and the random error of the measurements per NIST Technical Note 1297. The uncertainty listed is the expanded uncertainty with a coverage factor of 2 (k=2). To validate the accuracy of our optical methods, NIST certified microsphere standards were measured using the same method. The size distribution (standard deviation) was obtained by optical microscopy, electron microscopy or electrical resistance analysis depending on the size of the particles. 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 voids the warranty and invalidates the certification and traceability of these products.

5. OPERATING INSTRUCTIONS The microspheres are dry and therefore should not be shaken as this may produce static, making the particles difficult to handle. They may be suspended in water by wetting the microspheres with alcohol or surfactant, adding diluent and sonicating in a sonic bath. Do not sonicate suspensions in glass containers to prevent shedding or chipping particles into the suspension.

6. SAFETY AND HANDLING PRECAUTIONS Avoid aerosol production in the workplace while handling these products, or wear a suitable filter respirator when necessary. For particles smaller than 20 µm, it is highly recommended that the bottle be opened in an enclosed space with little or no air movement. These microspheres are packaged as a dry powder, and may form an aerosol. 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 introducing moisture into the product. Wear suitable eye protection and store upright in a dry place. In case of spills, wash or wipe the area thoroughly with a damp cloth. Caution: surfaces covered with dry spheres may be very slippery. Dispose of as normal laboratory waste. Read the MSDS for any special disposal procedures. Each bottle has a limited shelf life and should not be used after its expiration date.

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

THE FOREGOING WARRANTY SHALL BE IN LIEU OF ANY OTHER WARRANTIES, EXPRESS OR IMPLIED, INCLUDING WITHOUT LIMITATION, ANY IMPLIED WARRANTY OF MERCHANTABILITY AND FITNESS FOR A PARTICULAR PURPOSE. IN NO EVENT SHALL MICROGENICS BE LIABLE FOR INDIRECT, SPECIAL, INCIDENTAL OR CONSEQUENTIAL DAMAGES.