

NANOSPHERE™ SIZE STANDARDS NIST Traceable Mean Diameter

1. DESCRIPTION These particle size standards provide accurate and traceable size calibration for particle size analysis. They are part of a series of polymer microspheres with calibrated mean diameters traceable to the Standard Meter through the National Institute of Standards and Technology (NIST). Diameters from 20 nanometers (nm) to 160 micrometers (µm) are available as aqueous suspensions in dropper-tipped vials, calibrated by photon correlation spectroscopy (PCS), transmission electron microscopy (TEM) or optical microscopy. The aqueous medium has been prepared to promote dispersion and reduce clumping of the particles. The approximate particle concentration in percent solids is given to facilitate dilution for the calibration and validation of particle analyzers. Diameters from 200 µm to 1000 µm are available as dry spheres, calibrated by optical microscopy. The certified mean diameter is traceable to NIST. Other values are for information only and should not be used as calibration values.

2. PHYSICAL DATA

Certified Mean Diameter:	Catalog Number: 3020A, Nominal 20 nm
Standard Deviation:	23 nm ± 2 nm, k=2
Microsphere Composition:	Not determined or specified
Microsphere Density:	Polystyrene
Index of Refraction:	1.05 g/cm ³
Approximate Concentration:	1.59 @ 589 nm
	1% solids

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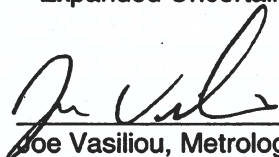
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CERTIFICATE OF CALIBRATION AND TRACEABILITY

This certifies that the calibrated mean diameter dimension was transferred by photon correlation spectroscopy (PCS) from National Institute of Standards and Technology (NIST) certified microspheres (Standard Reference Material 1963, 1964 or 1691). These microspheres were used to validate the accuracy and traceability of the PCS instrument.

Catalog Number: 3020A, Nanosphere™ Size Standards

Certification Date:	October 25, 2018
Certified Batch:	3020-013
Production Batch:	3020-039
Certified Mean Diameter:	23 nm
Expanded Uncertainty:	± 2 nm, k=2

 10-26-18
Joe Vasiliou, Metrologist
Thermo Fisher Scientific Particle Technology



Packaging Lot # 204663

Expiration Date: NOV'21

3. MEASUREMENT METHODOLOGY The certified mean diameter of this product was obtained using photon correlation spectroscopy, also known as quasi-elastic light scattering or dynamic light scattering. The accuracy of the instrument was validated with NIST certified microsphere standards. 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 ($k=2$). The size distribution is not measured for this product.

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. The Certified Batch is the master batch of material that is measured and certified with a NIST traceable mean diameter. The Production Batch represents the intermediate material from which the final product is made. Several Production Batches can be made from one Certified Batch.

5. OPERATING INSTRUCTIONS For ease of use, standards below 200 μm are packaged in an aqueous suspension. They must be thoroughly dispersed in the bottle to assure statistically consistent samples. To disperse the particles, gently invert the bottle several times, then immerse in a low power ultrasonic bath (10 seconds). Do not shake the bottle, as the small bubbles formed may introduce statistical artifacts. Before using, clear the tip of residue by dispensing 2 - 3 drops into a waste container. Dispense immediately after dispersion using the dropper tip.

6. SAFETY AND HANDLING PRECAUTIONS The 20 – 40 nm suspensions contain large amounts of surfactant which will form a residue when the particles are dried or dispersed as an aerosol. These products are not recommended for applications such as surface deposition or aerosol generation. Avoid inhalation or ingestion of the particles. Wear a suitable filter respirator when necessary. These products should only be used by trained scientific personnel. A Material Safety Data Sheet is included with each package.

7. STORAGE AND DISPOSAL *Due to the high surfactant content in the solution, the 20 – 40 nm standards should be stored at room temperature.* Do not refrigerate or freeze the particle suspension. Keep the bottle tightly sealed to avoid contamination, and store it upright to prevent clogging the tip with particles. In case of spills, wash or wipe the area thoroughly. Dispose of as normal laboratory waste. There are no 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.

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