Bangs Laboratories
BEADS ABOVE THE REST

# NIST Traceable Size Standards

Product Data Sheet 734

## INTRODUCTION

Accurate particle size and distribution analysis is critical to particle-based technologies in industry and research. The particle sizing instruments used to support research, manufacturing, and QC efforts in these sectors must be rigorously calibrated and validated to ensure the integrity of results. Particle size standards may be used to validate sizing instruments across their dynamic ranges. They are suitable for use in the performance of routine instrument calibration checks and corrections, and in the support of practice standards, such as those published by ISO, ASTM International, CEN, and other organizations. Additionally, the use of reference material permits the standardization of results between runs, instruments and laboratories, and over time.

## DESCRIPTION

Our NIST Traceable Size Standards are monodisperse polystyrene spheres available in diameters ranging from 40nm to 175µm. Suspensions are conveniently packaged in dropper bottles at 1% solids, and each bottle is provided with a Certificate of Calibration and Traceability. Further lot specific data (e.g.%CV) are provided for informational purposes, but are not certified parameters. Standards are supplied in de-ionized water with a trace amount of a proprietary surfactant and sodium azide.

As each particle sizing methodology has a characteristic dynamic range, we utilize three instruments to span our full range of Size Standards. These include:

- 40nm - 450nm: CPS Disc Centrifuge
- 500nm - 9.0µm: BI-DCP Disc Centrifuge
- 10.0µm - 175.0µm: Accusizer 780 Optical Particle Sizer

The mean diameter is determined for the major peak, and reported on the Certificate of Calibration and Traceability. It is important to note that our Standards (and the NIST SRMs to which they are traceable) are not size distribution standards, and while we do report %CV for informational purposes, this value is not considered to be certified or traceable to NIST.

## PROCEDURE - *Particle Sizing*

1. Manually shake or briefly (pulse) sonicate the suspension prior to use.

2. Prepare a sample that is appropriate for the instrument / technology, e.g. dilute to the required concentration. Please note that dilution may effectively reduce the surfactant concentration of the sample and cause beads to behave in a more hydrophobic manner, e.g. exhibit stickiness / transitory aggregation. If appropriate, a low concentration of surfactant may be added to the sample, and rotation and / or (careful) sonication may be employed to ensure a monodispersed preparation.

**Note:** Aggregated or highly concentrated samples may skew sizing results due to an effective 'growth' in particle diameter, or co-incidence of particles in the detection zone. Inconsistent particle concentration (and, by extension, inconsistent particle count rates) can be a source of variability for some sizing technologies. Standardized sample preparation is important to achieving the most consistent results.

## IMPORTANT NOTE ON EXPECTED RESULTS

For NIST-Traceable Size Standards, the formal Lot-specific mean diameter is provided on the Certificate of Calibration and Traceability. We do not offer pass / fail criteria as these need to be established by each customer, taking the underlying sizing methodology, software algorithms, historical instrument performance, and sample preparation into consideration.

We anticipate that different values will be returned by different sizing methodologies, though it is often possible to establish a high correlation between them. See References for information regarding different sizing methodologies.

We encourage facilities to conduct several runs over time (and of different Lots of size standards, if available), when establishing in-house criteria related to instrument performance. This allows operators to develop a deeper understanding of their instruments (both capabilities and limitations) and to set meaningful QC specifications.

## REFERENCES


1. **Farrell E.** A Guide to Proper Sample Preparation: Electrostatically-Stabilized Nanoparticles in Water. Brookhaven Instruments, July 2010.

2. **Jillavenkatesa A, Dapkunas SJ, Lum L-S H,** Particle Size Characterization, NIST special publication 960-1, 2001.

3. **Weiner BB,** A Guide to Choosing a Particle Sizer, Brookhaven Instruments.


## CHARACTERISTICS

| | |
|---|---|
| Composition: | Polystyrene |
| % Solids: | 1% |
| Refractive Index (589nm): | 1.59* |
| Density (g/cm$^3$): | 1.05* |

* Values are as reported in the literature for bulk polymer.

## STORAGE AND STABILITY

Store at 2-8˚C. Do not freeze. Refrigerated storage is intended to deter the growth of opportunistic microorganisms within suspension; it is important to note that biocontamination is expected to alter the sizing profile of the suspension. Freezing of particles may result in irreversible aggregation.

## SAFETY

This particle suspension contains sodium azide. Sodium azide may react with lead and copper plumbing to form explosive metal azides. Upon disposal of material, flush with a large volume of water to prevent azide accumulation. Please consult the Safety Data Sheet for more information.

**This product is for Research Use Only and is not intended for use in humans or for *in vitro* diagnostic use.**

## RELATED TECHNICAL LITERATURE

TN 208 - *Microsphere Sizing*
TN 105 - *Microsphere Size Standards*

## ORDERING INFORMATION

| Cat. Number | Description | Sizes |
|---|---|---|
| NT02N | NIST Traceable Particle Size Standard, 40nm | 15mL |
| NT03N | NIST Traceable Particle Size Standard, 60nm | 15mL |
| NT04N | IST Traceable Particle Size Standard, 80nm | 15mL |
| NT05N | NIST Traceable Particle Size Standard, 100nm | 15mL |
| NT06N | NIST Traceable Particle Size Standard, 150nm | 15mL |
| NT07N | NIST Traceable Particle Size Standard, 200nm | 15mL |
| NT08N | IST Traceable Particle Size Standard, 300nm | 15mL |
| NT09N | NIST Traceable Particle Size Standard, 400nm | 15mL |
| NT10N | NIST Traceable Particle Size Standard, 500nm | 15mL |
| NT11N | NIST Traceable Particle Size Standard, 600nm | 15mL |
| NT12N | NIST Traceable Particle Size Standard, 700nm | 15mL |
| NT13N | NIST Traceable Particle Size Standard, 800nm | 15mL |
| NT14N | NIST Traceable Particle Size Standard, 900nm | 15mL |
| NT15N | NIST Traceable Particle Size Standard, 1µm | 15mL |
| NT16N | NIST Traceable Particle Size Standard, 1.5µm | 15mL |
| NT17N | NIST Traceable Particle Size Standard, 2µm | 15mL |
| NT18N | NIST Traceable Particle Size Standard, 2.5µm | 15mL |
| NT19N | NIST Traceable Particle Size Standard, 3µm | 15mL |
| NT20N | NIST Traceable Particle Size Standard, 3.5µm | 15mL |
| NT21N | NIST Traceable Particle Size Standard, 4µm | 15mL |
| NT22N | NIST Traceable Particle Size Standard, 5µm | 15mL |
| NT23N | NIST Traceable Particle Size Standard, 6µm | 15mL |
| NT24N | NIST Traceable Particle Size Standard, 7µm | 15mL |
| NT25N | NIST Traceable Particle Size Standard, 8µm | 15mL |
| NT26N | NIST Traceable Particle Size Standard, 9µm | 15mL |

| Cat. Number | Description | Sizes |
|---|---|---|
| NT27N | NIST Traceable Particle Size Standard, 10µm | 15mL |
| NT28N | NIST Traceable Particle Size Standard, 12µm | 15mL |
| NT29N | NIST Traceable Particle Size Standard, 15µm | 15mL |
| NT30N | NIST Traceable Particle Size Standard, 20µm | 15mL |
| NT31N | NIST Traceable Particle Size Standard, 25µm | 15mL |
| NT32N | NIST Traceable Particle Size Standard, 30µm | 15mL |
| NT33N | NIST Traceable Particle Size Standard, 40µm | 15mL |
| NT34N | NIST Traceable Particle Size Standard, 50µm | 15mL |
| NT35N | NIST Traceable Particle Size Standard, 60µm | 15mL |
| NT36N | NIST Traceable Particle Size Standard, 80µm | 15mL |
| NT37N | NIST Traceable Particle Size Standard, 100µm | 15mL |
| NT38N | NIST Traceable Particle Size Standard, 125µm | 15mL |
| NT39N | NIST Traceable Particle Size Standard, 150µm | 15mL |
| NT40N | NIST Traceable Particle Size Standard, 175µm | 15mL |

Order online any time at **www.bangslabs.com.**

## TRADEMARKS

Bangs Laboratories, Inc. - Bangs Laboratories™, Bangs Labs™
International Organization for Standardization - ISO®
National Institute of Standards and Technology - NIST®