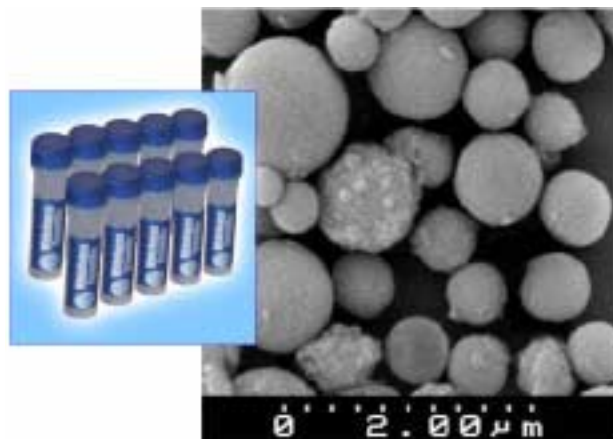


## POLYDISPERSE PARTICLE STANDARDS

- Developed to support the official Community Bureau of Reference (BCR) particle metrology standards
- Traceability through NIST, BCR and NPL standards
- Calibration for any method of particle size analysis
- One of the largest International teams ever assembled
- Unambiguous primary methods used – microscopy, sieving, sedimentation and the Coulter method
- 7 standards covering the size range 0.1 – 2000µm
- Produced as single-shot vials from 10mg – 7g
- Competitive pricing encourages regular calibration



### Background

The Polydisperse Particle Standards were formally known as the BCR 'Mirror' Standards because they mirrored the size ranges of an official set of spherical reference standards that were being developed for the European Community (Community Bureau of Reference – BCR). The 'Mirror' Standards were made both to assess the performance of the analytical laboratories and to augment a limited supply of the official standards. Although sub-divided, the BCR samples were never certified, which leaves these new Polydisperse Particle Standards as the most comprehensively analysed set of spherical particle size reference standards available.

### Participating Laboratories

AEA Technology	UK	Bologna University	Italy	Bradford University	UK	Clausthal – TU	Germany
CNRS – Nancy	France	Coulter Electronics	UK	Delft – TU	Holland	Duisburg – TU	Germany
Health & Safety Executive	UK	IFTTS, Foulyronnes – Agen	France	INRS, Vanoevre	France	Kodak, Chalons sur Saone	France
LERMAT, Caen	France	Loughborough University	UK	Nisshin Flour Mills, Saitama	Japan	Pavia University	Italy
Salerno University	Italy	Solvay et Cie, Brussels	Belgium	Whitehouse Scientific	UK		

### 0.1 – 1µm Standard

This new standard has been introduced by popular demand resulting from an increased interest in the properties and performance of Nanoparticles or sub-micron powders. The soda-lime glass microspheres are supplied as dry powders in a 5ml pipetting bottle. To analyse, simply add water and place in an ultra-sonic bath for a few minutes, shake well and pipette the complete bottle into the particle size measurement instrument. The standard has been characterised by scanning electron-microscopy, pipette centrifuge and some of the latest laser sizing methods.

### Price List

September 2007 – currency conversions are provided as a guide only and are subject to fluctuation

Nominal Size (µm)	Nominal Wt per bottle (g)	Catalogue Number	Price for 10 bottles		
			£	€*	\$*
0.1 – 1	0.01	PS180	206	315	415
	0.02	PS181	240	365	485
1 – 10	0.025	PS190	69	105	140
	0.05	PS191	92	140	185
	0.10	PS192	115	175	235
	0.25	PS193	156	240	315
3 – 30	0.50	PS194	206	315	415
	0.025	PS200	59	90	120
	0.05	PS201	69	105	140
	0.10	PS202	92	140	185
	0.25	PS203	115	175	235
	0.50	PS204	156	240	315
10 – 100	1.0	PS205	206	315	415
	0.05	PS211	59	90	120
	0.10	PS212	80	125	165
	0.25	PS213	102	155	205
50 – 350	0.50	PS214	146	225	295
	1.0	PS215	194	295	390
	0.10	PS222	59	90	120
	0.25	PS223	80	125	165
	0.50	PS224	102	155	205
150 – 650	1.0	PS225	146	225	295
	2.5	PS226	173	265	350
	5.0	PS227	194	295	390
	0.25	PS232	80	125	165
	0.50	PS233	102	155	205
500 - 2000	1.0	PS234	146	225	295
	2.5	PS235	173	265	350
	5.0	PS236	194	295	390
	7.0	PS237	260	395	525

### Final results for the 10 – 100µm standard

Method	Number of Labs	Size at Fixed Percentiles (µm)				
		10%	25%	50%	75%	90%
<b>Microscopy</b>						
Mean	4	26.5	32.6	41.7	53.0	63.4
SD		1.2	1.8	2.1	1.1	1.0
<b>Sieving</b>						
Mean	3	24.9	32.1	41.4	52.4	62.2
SD		0.3	0.4	0.4	0.9	0.3
<b>Coulter</b>						
Mean	7	25.0	31.0	40.9	52.5	63.0
SD		0.5	1.1	1.5	1.7	1.9
<b>Final Size</b>						
Mean	14	25.4	31.7	41.3	52.6	62.9
Uncertainty	labs	2.1	3.0	3.3	2.9	3.1

Methods used: Microscopy, Sonic Sieving and Coulter Counter

### Analysis summary

Reference Size (µm)	Size at fixed percentiles (µm)				
	10	25	50	75	90
500 – 2000	691	853	1010	1248	1534
(+/-)	6	8	11	24	42
150 – 650	244	306	362	424	527
(+/-)	4	5	5	4	18
50 – 350	94	119	151	190	239
(+/-)	3.5	1.2	2.5	4.8	6.0
10 – 100	25.4	31.7	41.3	52.6	62.9
(+/-)	2.1	3.0	3.3	2.9	3.1
3 – 30	9.1	11.0	123.4	16.5	20.3
(+/-)	0.9	0.7	0.9	1.1	1.4
1 – 10	2.9	3.4	4.2	5.3	6.2
(+/-)	0.2	0.2	0.3	0.3	0.6
0.1 – 1	<b>Certified and characterized – see web site for complete data</b>				

(Uncertainty – confidence level not less than 95%)

BCR program review paper: G R Rideal, J A Dodds, M-N Pons, K Leschonski, P J Lloyd, H G Marcus. The Development of New Reference Standards for Particle Sizing Instrument Calibration - World Congress on Particle Technology 3 (ICHE), 1998, Brighton, UK. See web site Library. Primary Methods only – Optical Microscopy, Electroformed Sieve Analysis, Andreasen Sedimentation and the Coulter (Electrical Sensing Zone) method. Specified traceability – BCR, NIST and NPL reference standards