

Thermal properties

Enthalpy and heat capacity

Code	Product	Unit
LGC2601	Indium - DSC calibration standard This certified reference material is intended for use in the calibration of differential scanning calorimeters and similar instruments. Certified values Enthalpy of fusion 3.296 kJ/mol Melting temperature 156.61 °C	500 mg
LGC2603	Naphthalene - DSC calibration standard This certified reference material is intended for use in the calibration of differential scanning calorimeters and similar instruments. Certified values Enthalpy of fusion 18.923 kJ/mol Melting temperature 80.23 °C	500 mg
LGC2604	Benzil - DSC calibration standard This certified reference material is intended for use in the calibration of differential scanning calorimeters and similar instruments. Certified values Enthalpy of fusion 23.26 kJ/mol Melting temperature 94.85 °C	500 mg
LGC2605	Acetanilide - DSC calibration standard This certified reference material is intended for use in the calibration of differential scanning calorimeters and similar instruments. Certified values Enthalpy of fusion 21.793 kJ/mol Melting temperature 114.34 °C	500 mg
LGC2606	Benzoic acid - DSC calibration standard This certified reference material is intended for use in the calibration of differential scanning calorimeters and similar instruments. Certified values Enthalpy of fusion 17.98 kJ/mol Melting temperature 122.35 °C	500 mg
LGC2607	Diphenylacetic acid - DSC calibration standard This certified reference material is intended for use in the calibration of differential scanning calorimeters and similar instruments. Certified values Enthalpy of fusion 31.16 kJ/mol Melting temperature 147.19 °C	500 mg
LGC2608	Lead - DSC calibration standard This certified reference material is intended for use in the calibration of differential scanning calorimeters and similar instruments. Certified values Enthalpy of fusion 4.765 kJ/mol Melting temperature 327.47 °C	500 mg
LGC2609	Tin - DSC calibration standard This certified reference material is intended for use in the calibration of differential scanning calorimeters and similar instruments. Certified values Enthalpy of fusion 7.187 kJ/mol Melting temperature 231.92 °C	500 mg
LGC2610	Biphenyl - DSC calibration standard This certified reference material is intended for use in the calibration of differential scanning calorimeters and similar instruments. Certified Values Enthalpy of fusion 18.60 kJ/mol Melting temperature 68.93 °C	500 mg
LGC2611	Zinc - DSC calibration standard This certified reference material is intended for use in the calibration of differential scanning calorimeters and similar instruments. Certified values Enthalpy of fusion 7.103 kJ/mol Melting temperature 419.53 °C	500 mg
LGC2612	Aluminium - DSC calibration standard This certified reference material is intended for use in the calibration of differential scanning calorimeters and similar instruments. Certified values Enthalpy of fusion 10.827 kJ/mol Melting temperature 660.33 °C	500 mg

Thermal properties

Code	Product	Unit
LGC2613	Phenyl salicylate - DSC calibration standard This certified reference material is intended for use in the calibration of differential scanning calorimeters and similar instruments. Certified values Enthalpy of fusion 19.18 kJ/mol Melting temperature 41.79 °C	500 mg
LGC2013	DSC purity set A series of mixtures of benzil in biphenyl intended for evaluating various features of the DSC technique (e.g. bias, repeatability, applicable impurity range) when the technique is used for determining the impurity content of organic compounds.. Certified values Total impurity (mole %) Uncertainty (mole %) Total impurity (mole %) Uncertainty (mole %) 0.1 0.1 2.1 0.2 1.1 0.2 2.6 0.2 1.6 0.2 3.1 0.2	6 x 500 mg
NIST-2232	Indium - DSC calibration standard DSC calibration standard Certified values Enthalpy of fusion 28.51 J/g Melting temperature 156.5985 °C	1 g
NIST-2235	Bismuth - DSC calibration standard Certified values Enthalpy of fusion 53.146 J/g Fusion temperature 544.556 K	1.5 g
NIST-2225	Mercury - DSC calibration standard Certified values Enthalpy of fusion 11.469 kJ/mol Melting temperature 234.30 K	2.5 g
NIST-705A	Polystyrene - Heat capacity and molecular weight Molecular weight (MW) values, measured using various techniques, and limiting viscosity (LV) numbers. Certified values M _n by membrane osmometry 170,900 g/mol LV in benzene (25 °C) 74.3 mL/g M _w by light scattering 179,300 g/mol LV in benzene (25 °C) 74.5 mL/g M _w by sedimentation equilibrium 189,800 g/mol LV in cyclohexane (25 °C) 35.4 mL/g For heat capacity please ask for detailed list	5 g
NIST-720	Synthetic sapphire - Enthalpy and heat capacity Relative enthalpy and heat capacity from 10 to 2250 K	15 g
NIST-781D2	Molybdenum - Enthalpy and heat capacity Relative enthalpy and heat capacity from 273.15 to 2800 K	Each
NIST-1514	Thermal analysis purity set Set of 4 x 0.5 g A set of materials containing pure phenacetin and phenacetin doped with nominal 0.7, 2 and 5 mol percent of p-aminobenzoic acid	set (4)

Melting, freezing and triple points

LGC2411	Phenyl salicylate - Melting point This certified reference material is intended for use in checking and calibrating apparatus used for determining melting points of samples in glass tubes. Certified values Thermodynamic melting point 41.50 °C Dynamic melting points (0.2 °C/min heating rate): Onset of melting 41.55 °C Meniscus point 41.70 °C Liquefaction point 41.85 °C	500 mg
LGC2401	4-Nitrotoluene - Melting point This certified reference material is intended for use in checking and calibrating apparatus used for determining melting points of samples in glass tubes. Certified values Dynamic melting points (0.2 °C/min heating rate): Onset of melting 51.36 °C Meniscus point 51.58 °C Liquefaction point 51.71 °C	2 x 250 mg

Thermal properties

Code	Product	Unit
LGC2402	Naphthalene - Melting point This certified reference material is intended for use in checking and calibrating apparatus used for determining melting points of samples in glass tubes. Certified values Thermodynamic melting point80.11 °C Dynamic melting points (0.2 °C/min heating rate): Onset of melting 80.20 °C Meniscus point..... 80.37 °C Liquefaction point..... 80.71 °C	2 x 250 mg
LGC2403	Benzil - Melting point This certified reference material is intended for use in checking and calibrating apparatus used for determining melting points of samples in glass tubes. Certified values Thermodynamic melting point94.55 °C Dynamic melting points (0.2 °C/min heating rate): Onset of melting 94.43 °C Meniscus point..... 94.77 °C Liquefaction point..... 95.08 °C	500 mg
LGC2404	Acetanilide - Melting point This certified reference material is intended for use in checking and calibrating apparatus used for determining melting points of samples in glass tubes. Certified values Thermodynamic melting point113.94 °C Dynamic melting points (0.2 °C/min heating rate): Onset of melting 113.46 °C Meniscus point..... 113.88 °C Liquefaction point..... 114.27 °C	500 mg
LGC2405	Benzoic acid - Melting point This certified reference material is intended for use in checking and calibrating apparatus used for determining melting points of samples in glass tubes. Certified values Dynamic melting point (0.2 °C/min heating rate) Onset of melting 121.80 °C Meniscus point..... 122.10 °C Liquefaction point..... 122.37 °C	2 x 250 mg
LGC2406	Diphenylacetic acid - Melting point This certified reference material is intended for use in checking and calibrating apparatus used for determining melting points of samples in glass tubes. ^A Certified values Thermodynamic melting point147.05 °C Dynamic melting points (0.2 °C/min heating rate): Onset of melting 147.12 °C Meniscus point..... 147.21 °C Liquefaction point..... 147.29 °C	2 x 250 mg
LGC2407	Anisic acid - Melting point This certified reference material is intended for use in checking and calibrating apparatus used for determining melting points of samples in glass tubes. Certified values Thermodynamic melting point183.09 °C Dynamic melting points (0.2 °C/min heating rate): Onset of melting 183.11 °C Meniscus point..... 183.29 °C Liquefaction point..... 183.72 °C	500 mg
LGC2408	2-Chloroanthraquinone - Melting point This certified reference material is intended for use in checking and calibrating apparatus used for determining melting points of samples in glass tubes. Certified values Thermodynamic melting point209.12 °C Dynamic melting points (0.2 °C/min heating rate): Onset of melting 209.18 °C Meniscus point..... 209.50 °C Liquefaction point..... 209.78 °C	500 mg
New NIM-GBW13232C	Naphthalene - Melting point Certified values Capillary melting point (completely melted, 0.20 °C/min).....80.58 ± 0.11 °C Capillary melting point (completely melted, 1.0 °C/min).....81.09 ± 0.20 °C Melting point (F = 1, ΔT= 0)80.24 ± 0.05 °C	2 g

Thermal properties

Code	Product	Unit
LGC2409	Carbazole - Melting point This certified reference material is intended for use in checking and calibrating apparatus used for determining melting points of samples in glass tubes. Certified values Thermodynamic melting point..... 245.4 °C Dynamic melting points (0.2 °C/min heating rate): Onset of melting..... 244.71 °C Meniscus point..... 244.23 °C Liquefaction point..... 245.58 °C	2 x 250 mg
NCS AS93109	Azobenzene - Melting point Certified melting point..... 68.34 °C	2 g
NCS AS93110	Methylprotocatechuic - Melting point Certified melting point..... 81.85 °C	2 g
NCS AS93111	Acetanil - Melting point Certified melting point..... 114.55 °C	2 g
New NIM-GBW13233B	Benzoic acid - Melting point Certified values Capillary melting point (completely melted, 0.20 °C/min)..... 122.85 ± 0.11 °C Capillary melting point (completely melted, 1.0 °C/min)..... 123.37 ± 0.20 °C Melting point (F = 1, ΔT = 0)..... 122.35 ± 0.05 °C	2 g
NCS AS93112	p-Acetophenetidine - Melting point Certified melting point..... 134.96 °C	2 g
New NIM-GBW13234C	1,6-Adipic acid - Melting point Certified values Capillary melting point (completely melted, 0.20 °C/min)..... 152.55 ± 0.11 °C Capillary melting point (completely melted, 1.0 °C/min)..... 153.16 ± 0.20 °C Melting point (F = 1, ΔT = 0)..... 151.63 ± 0.05 °C	2 g
NCS AS93113	Albexan - Melting point Certified melting point..... 164.70 °C	2 g
New NIM-GBW13235B	Anisic acid - Melting point Certified values Capillary melting point (completely melted, 0.20 °C/min)..... 184.15 ± 0.11 °C Capillary melting point (completely melted, 1.0 °C/min)..... 184.74 ± 0.20 °C Melting point (F = 1, ΔT = 0)..... 183.36 ± 0.05 °C	2 g
NCS AS93114	Amber acid - Melting point Certified melting point..... 184.02 °C	2 g
NCS AS93115	Sulfadimidine - Melting point Certified melting point..... 198.32 °C	2 g
NCS AS93116	Cyanoguanidine - Melting point Certified melting point..... 208.62 °C	2 g
New NIM-GBW13236B	Anthracene - Melting point Certified values Capillary melting point (completely melted, 0.20 °C/min)..... 216.51 ± 0.11 °C Capillary melting point (completely melted, 1.0 °C/min)..... 217.11 ± 0.20 °C Melting point (F = 1, ΔT = 0)..... 216.07 ± 0.05 °C	2 g
NCS AS93117	Saccharin - Melting point Certified melting point..... 228.41 °C	2 g
NCS AS93118	Coffeine - Melting point Certified melting point..... 236.26 °C	2 g
NIM-GBW13237B	p-Nitrobenzoic acid - Melting point Certified values Capillary melting point (completely melted, 0.20 °C/min)..... 240.57 ± 0.11 °C Capillary melting point (completely melted, 1.0 °C/min)..... 241.33 ± 0.20 °C Melting point (F = 1, ΔT = 0)..... 239.58 ± 0.05 °C	2 g
New NIM-GBW13231C	4-Nitrotoluene - Melting point Certified values Capillary melting point (completely melted, 0.20 °C/min)..... 52.01 ± 0.11 °C Capillary melting point (completely melted, 1.0 °C/min)..... 52.56 ± 0.20 °C Melting point (F = 1, ΔT = 0)..... 51.58 ± 0.05 °C	2 g
NCS AS93119	Chocolax - Melting point Certified melting point..... 261.43 °C	2 g

Thermal properties

Code	Product	Unit
NIM-GBW13238C	Anthraquinone - Melting point Certified values Capillary melting point (completely melted, 0.20 °C/min).....285.15 ± 0.11 °C Capillary melting point (completely melted, 1.0 °C/min).....285.69 ± 0.20 °C Melting point (F = 1, ΔT = 0)284.62 ± 0.05 °C	2 g
NIST-741a	Tin - Freezing point For use in defining fixed points of the International Temperature Scale of 1990 (ITS-90). Certified freezing point.....231.928 °C	200 g
NIST-743	Mercury - Triple point For use in defining fixed points of the International Temperature Scale of 1990 (ITS-90). Certified triple point..... -38.8344 °C	680 g
NIST-1745	Indium - Freezing point For use in defining fixed points of the International Temperature Scale of 1990 (ITS-90). Certified freezing point.....156.5985 °C	200 g
NIST-1746	Silver - Freezing point For use in defining fixed points of the International Temperature Scale of 1990 (ITS-90). Certified freezing point.....961.78 °C	300 g
NIST-1747	Tin - Freezing point A fixed point device for use in the realisation of the International Temperature Scale of 1990 (ITS-90). Certified freezing point.....231.928 °C	cell
NIST-1748	Zinc - Freezing point A fixed point device for use in the realisation of the International Temperature Scale of 1990 (ITS-90). Certified freezing point.....419.527 °C	cell
NIST-740a	Zinc - Freezing point For use in defining fixed points of the International Temperature Scale of 1990 (ITS-90). Certified freezing point.....419.527 °C	200 g
NIST-45d	Copper - Freezing point Moderate purity material for use in preparing reference point devices and for calibrating thermometers, thermocouples and other temperature measuring devices. Certified freezing point.....1084.6 °C	450 g
NIST-49e	Lead - Freezing point Moderate purity material for use in preparing reference point devices and for calibrating thermometers, thermocouples and other temperature measuring devices. Certified freezing point.....327.453 °C	600 g
NIST-742	Alumina - Melting point Moderate purity material for use in preparing reference point devices and for calibrating thermometers, thermocouples and other temperature measuring devices. Certified melting point.....2052 °C	10 g
NIST-1968	Gallium - Melting point/triple point A fixed-point device for use in the realisation of internationally accepted secondary reference points and/or triple points. They are not intended for calibration of differential scanning calorimeters. Certified melting point/triple point29.7646 °C	unit
NIST-1751	Gallium - Melting point This Standard Reference Material (SRM [®]) is intended primarily for use as one of the defining fixed points of the International Temperature Scale of 1990 (ITS-90). The melting point is realised as the plateau temperature of the melting curve of slowly-melting, high-purity (mass fraction ≥ 99.9999 % pure) gallium. Certified melting-point temperature 29.764 6 °C ± 0.000 07 °C	200 g
NIST-1969	Rubidium - Melting point/triple point A fixed-point device for use in the realisation of internationally accepted secondary reference points and/or triple points. They are not intended for calibration of differential scanning calorimeters. Certified melting point/triple point39.30 °C	unit
NIST-1970	Succinonitrile - Melting point/triple point A fixed-point device for use in the realisation of internationally accepted secondary reference points and/or triple points. They are not intended for calibration of differential scanning calorimeters. Certified melting point/triple point58.0642 °C	unit
NIST-1971	Indium - Melting point/triple point A fixed-point device for use in the realisation of internationally accepted secondary reference points and/or triple points. They are not intended for calibration of differential scanning calorimeters. Certified melting point/triple point156.598 °C	60 g

Thermal properties

Code	Product	Unit
NIST-1972	1,3-Dioxolan-2-one (ethylene carbonate) - Melting point/triple point A fixed-point device for use in the realisation of internationally accepted secondary reference points and/or triple points. They are not intended for calibration of differential scanning calorimeters. Certified melting point/triple point 36.3143 °C	60 g

Flash point

ERM-FC032	n-Nonane The certified value was determined by the Abel closed cup method described in the Institute of Petroleum Standard IP170/95 and also published as British Standard BS2000:Part 170: 1995. The certified value is corrected to standard barometric pressure at 0°C. Certified value Non-equilibrium flash point 32.5 °C	100 mL
ERM-FC033	n-Decane The certified value was determined by the Abel closed cup method described in the Institute of Petroleum Standard IP170/95 and also published as British Standard BS2000:Part 170: 1995. The certified value is corrected to standard barometric pressure at 0°C. Certified value Non-equilibrium flash point 50 °C	100 mL
LGC2000	Diethyl phthalate This certified reference material is intended for use in checking and calibrating apparatus used for determining flash point by closed cup equilibrium methods. The certified value was determined from the results of an interlaboratory study, where the participants used IP/304 Pensky-Martens Closed Cup or IP/303 Setaflash methods. Certified value Equilibrium closed cup flash point 159.0 °C	500 mL

Combustion calorimetry

NIST-39J	Benzoic acid - Heat of combustion Certified value 26.434 MJ/kg	30 g
NIST-1656	Thianthrene - Heat of combustion Certified value 33.480 MJ/kg	30 g
NIST-1657	Synthetic refuse-derived fuel - Heat of combustion Certified values HHV* (dry) 13.87 ± 0.25 MJ/kg Dry ash 20.34 ± 0.54 wt% HHV* (dry, ash free) 17.40 ± 0.30 MJ/kg *HHV (Higher heating value) is the synonym for gross calorific value.	100 g
NIST-2151	Nicotinic acid - Heat of combustion Certified value 22.184 MJ/kg	25 g
NIST-2152	Urea Certified value 10.536 MJ/kg	25 g
NIST-2682b	Coal (sub-bituminous) - Sulphur, mercury and heat of combustion Certified values S 0.4917 % Hg 108.8 µg/kg Indicative values for chlorine, ash content, gross calorific value	50 g

Solution calorimetry

NIST-1655	Potassium chloride - water solution calorimetry Intended for use in verifying or comparing results obtained by calorimeters measuring enthalpies of endothermic solution processes. Certified value Heat of solution (absorbed) 235.86 J/g	30 g
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Thermal conductivity

IRMM-440A	Resin bonded fibre board (300 x 300 x 35 mm) - Thermal conductivity Certified value for thermal conductivity between -10°C and +50 °C	board
IRMM-440B	Resin bonded fibre board (500 x 500 x 35 mm) - Thermal conductivity Certified value for thermal conductivity between -10°C and +50 °C	board
IRMM-440C	Resin bonded fibre board (600 x 600 x 35 mm) - Thermal conductivity Certified value for thermal conductivity between -10°C and +50 °C	board
IRMM-440D	Resin bonded fibre board (1000 x 1000 x 35 mm) - Thermal conductivity Certified value for thermal conductivity between -10°C and +50 °C	board

Code	Product	Unit
NIST-RM 8420	Electrolytic iron rod 0.64 cm (D) x 5.0 cm Thermal conductivity and electrical resistivity as a function of temperature (2-1000 K)	rod
BCR-724A	Glass-ceramic - Thermal diffusivity, thermal conductivity Rod in container (diam.= 13.0 mm height > 18 mm) Thermal diffusivity, α Certified value [m ² /s · 10 ⁻⁶] $\alpha = 4.406 - 1.351 \cdot 10^{-2} \cdot T + 2.133 \cdot 10^{-5} \cdot T^2 - 1.541 \cdot 10^{-8} \cdot T^3 + 4.147 \cdot 10^{-12} T^4$ Uncertainty:6.1% Thermal conductivity, λ Certified value [W/(m·K)] $\lambda = 2.332 + 515.1/T$ Uncertainty:6.5%	rod
BCR-724B	Glass-ceramic - Thermal diffusivity, thermal conductivity Rod in container (diam.= 13.9 mm height > 21 mm) Thermal diffusivity, α Certified value [m ² /s · 10 ⁻⁶] $\alpha = 4.406 - 1.351 \cdot 10^{-2} \cdot T + 2.133 \cdot 10^{-5} \cdot T^2 - 1.541 \cdot 10^{-8} \cdot T^3 + 4.147 \cdot 10^{-12} T^4$ Uncertainty:6.1% Thermal conductivity, λ Certified value [W/(m·K)] $\lambda = 2.332 + 515.1/T$ Uncertainty:6.5%	rod
BCR-724C	Glass-ceramic - Thermal diffusivity, thermal conductivity Rod in container (diam.= 25.9 mm height > 22 mm) Thermal diffusivity, α Certified value [m ² /s · 10 ⁻⁶] $\alpha = 4.406 - 1.351 \cdot 10^{-2} \cdot T + 2.133 \cdot 10^{-5} \cdot T^2 - 1.541 \cdot 10^{-8} \cdot T^3 + 4.147 \cdot 10^{-12} T^4$ Uncertainty:6.1% Thermal conductivity, λ Certified value [W/(m·K)] $\lambda = 2.332 + 515.1/T$ Uncertainty:6.5%	rod
BCR-724D	Glass-ceramic - Thermal diffusivity, thermal conductivity Rod in container (diam.= 26.9 mm height > 22 mm) Thermal diffusivity, α Certified value [m ² /s · 10 ⁻⁶] $\alpha = 4.406 - 1.351 \cdot 10^{-2} \cdot T + 2.133 \cdot 10^{-5} \cdot T^2 - 1.541 \cdot 10^{-8} \cdot T^3 + 4.147 \cdot 10^{-12} T^4$ Uncertainty:6.1% Thermal conductivity, λ Certified value [W/(m·K)] $\lambda = 2.332 + 515.1/T$ Uncertainty:6.5%	rod
BCR-724E	Glass-ceramic - Thermal diffusivity, thermal conductivity Rod in container (diam.= 50.7 mm height > 25 mm) Thermal diffusivity, α Certified value [m ² /s · 10 ⁻⁶] $\alpha = 4.406 - 1.351 \cdot 10^{-2} \cdot T + 2.133 \cdot 10^{-5} \cdot T^2 - 1.541 \cdot 10^{-8} \cdot T^3 + 4.147 \cdot 10^{-12} T^4$ Uncertainty:6.1% Thermal conductivity, λ Certified value [W/(m·K)] $\lambda = 2.332 + 515.1/T$ Uncertainty:6.5%	rod

Thermal properties

Code	Product	Unit
Thermal expansion		
NIST-731L1	Borosilicate glass 6.4 mm x 51 mm Certified values for thermal expansion as a function of temperature (80-680 K)	5 cm
NIST-731L2	Borosilicate glass 6.4 mm x 102 mm Certified values for thermal expansion as a function of temperature (80-680 K)	10 cm
NIST-731L3	Borosilicate glass 6.4 mm x 152 mm Certified values for thermal expansion as a function of temperature (80-680 K)	15 cm
NIST-738	Stainless steel Certified values for thermal expansion as a function of temperature (293-780 K)	51 x 6.4 mm
Thermal resistance		
NIST-1449	Fumed silica board 60 cm x 60 cm x 2.54 cm Certified values for thermal resistance as a function of density and pressure	board
NIST-1459	Fumed silica board 30 cm x 30 cm x 2.45 cm Certified values for thermal resistance as a function of density and pressure	board
NIST-1452	Fibrous glass blanket for high precision measurements - Thermal resistance This Standard Reference Material (SRM [®]) is intended for use in evaluation of a guarded hot plate (GHP) or the calibration of a heat flow meter (HFV). It is supplied as a fibrous glass batt of nominal dimensions 60 x 60 x 2.54 cm. Each unit of NIST-1452 is a individually characterised specimen.	Each
Glass liquid temperature		
NIST-773	Soda-lime-silica 2.5 cm x 2.5 cm x 0.6 cm Intended for checking test methods and for calibrating equipment used to determine the liquidus temperature of glass by the gradient furnace method per ASTM C 829. <u>A (boat)</u> Certified value 988 °C <u>B (perforated plate)</u> Certified value 991 °C	65 g
NIST-1416	Aluminosilicate glass - Liquidus temperature Certified value for the gradient liquidus temperature is 1147 ± 4 °C	250 g
Temperature measuring devices		
NIST-1967	Platinum thermocouple Platinum wire 0.51 mm diameter and 1 m long Intended for use as a standard reference thermoelement for calibration of base-metal and noble-metal thermocouple materials (-197 °C - 1768 °C)	Each
NIST-1749	Gold vs. Platinum Thermocouple Thermometer Certified Thermometer for the range 0°C to 1000°C on the International Temperature Scale of 1990.	Each
NIST-1750	Standard Platinum Resistance Thermometer Certified Thermometer for the range 13.8033 K to 429.7485 K on the International Temperature Scale of 1990.	capsule

Particles and surface properties

Particle size

Code	Product	Unit																		
New ERM-FD100	<p>Colloidal silica in water - Particle size</p> <p>ERM-FD100 is a certified reference material and consists of colloidal silica nanoparticles suspended in a water-based solution. It is available in 10 mL pre-scored amber glass ampoules containing approximately 9 mL of suspension. The intended use is to check the performance of instruments and/or methods that characterise the particle size distribution of nanoparticles (particle size ranging from approximately 1 nm to approximately 100 nm) suspended in a liquid medium.</p> <table border="1"> <thead> <tr> <th colspan="3">Equivalent spherical diameter</th> </tr> <tr> <th></th> <th>Certified value</th> <th>Uncertainty</th> </tr> </thead> <tbody> <tr> <td>Intensity-weighted harmonic mean diameter ¹⁾</td> <td>19.0 nm</td> <td>0.6 nm</td> </tr> <tr> <td>Intensity-based modal Stokes diameter ²⁾</td> <td>20.1 nm</td> <td>1.3 nm</td> </tr> <tr> <td>Number-based modal diameter ³⁾</td> <td>19.4 nm</td> <td>1.3 nm</td> </tr> <tr> <td>Intensity-weighted mean diameter ⁴⁾</td> <td>21.8 nm</td> <td>0.7 nm</td> </tr> </tbody> </table> <p>¹⁾ As obtained by dynamic light scattering according to ISO 22412:2008 (cumulants method). ²⁾ As obtained by centrifuge liquid sedimentation according to ISO 13318-1:2001 (line-start method); density 2.3 g/cm³. ³⁾ As obtained by electron microscopy (transmission electron microscopy/scanning electron microscopy).</p> <p>Indicative values for equivalent spherical diameter, volume-weighted mean and Zeta Potential.</p>	Equivalent spherical diameter				Certified value	Uncertainty	Intensity-weighted harmonic mean diameter ¹⁾	19.0 nm	0.6 nm	Intensity-based modal Stokes diameter ²⁾	20.1 nm	1.3 nm	Number-based modal diameter ³⁾	19.4 nm	1.3 nm	Intensity-weighted mean diameter ⁴⁾	21.8 nm	0.7 nm	Amp.
Equivalent spherical diameter																				
	Certified value	Uncertainty																		
Intensity-weighted harmonic mean diameter ¹⁾	19.0 nm	0.6 nm																		
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Number-based modal diameter ³⁾	19.4 nm	1.3 nm																		
Intensity-weighted mean diameter ⁴⁾	21.8 nm	0.7 nm																		
BCR-066 - BCR-132																				
<p>For these materials the distribution is expressed as a curve of the cumulative mass of particles undersize versus particle size. In the case of particles of less than 90 µm diameter their size is expressed as the equivalent Stokes' diameter determined from the settling rate of the particles in a viscous fluid. For larger particles the equivalent volume diameter determined by sieving was preferred.</p>																				
BCR-066	<p>Quartz - Stokes' diameter</p> <p>Certified value</p> <p>Stokes' diameter 0.35 - 3.50 µm</p>	10 g																		
BCR-067	<p>Quartz - Stokes' diameter</p> <p>Certified values</p> <p>Stokes' diameter 2.4 - 32 µm</p>	10 g																		
BCR-068	<p>Quartz - Volume diameter</p> <p>Certified values</p> <p>Volume diameter 160 - 630 µm</p>	100 g																		
BCR-069	<p>Quartz - Stokes' diameter</p> <p>Certified values</p> <p>Stokes' diameter 14 - 90 µm</p>	10 g																		
BCR-070	<p>Quartz - Stokes' diameter</p> <p>Certified values</p> <p>Stokes' diameter 1.2 - 20 µm</p>	10 g																		
BCR-130	<p>Quartz - Volume diameter</p> <p>Certified values</p> <p>Volume diameter 50 - 220 µm</p>	50 g																		
BCR-131	<p>Quartz - Volume diameter</p> <p>Certified value</p> <p>Volume diameter 480 - 1800 µm</p>	200 g																		
BCR-132	<p>Quartz - Volume diameter</p> <p>Certified value</p> <p>Volume diameter 1400 - 5000 µm</p>	700 g																		
BCR-165	<p>Latex spheres, nominal 2 µ</p> <p>Average particle diameter 2.223 ± 0.013 µm</p> <p>Each vial contains 2 mL of an aqueous suspension of latex spheres at a mass concentration of about 0.2 g/L. About 0.5% of the particles are agglomerated doublets..</p>	vial																		
BCR-166	<p>Latex spheres, nominal 4.8 µ</p> <p>Each vial contains 2 mL of an aqueous suspension of latex spheres at a mass concentration of about 0.2 g/L. About 0.5% of the particles are agglomerated doublets.</p> <p>Average particle diameter 4.821 ± 0.019 µm</p>	vial																		
BCR-167	<p>Latex spheres, nominal 9.6 µ</p> <p>Each vial contains 2 mL of an aqueous suspension of latex spheres at a mass concentration of about 1.4 g/L. About 0.5% of the particles are agglomerated doublets.</p> <p>Average particle diameter 9.475 ± 0.018 µm</p>	vial																		

Particles and surface properties

Code	Product	Unit
New IRMM-304	Suspension of colloidal silica nanoparticles IRMM-304 is a quality control material of silica nanoparticles suspended in an aqueous solution. Information values (not certified) are assigned for frequency analysis and cumulant method using dynamic light scattering according to ISO 22412, as well as disc sedimentation according to ISO 13318. IRMM-304 is available in 10 mL pre-scored amber glass ampoules containing approximately 9 mL of suspension. The suspending medium is water-based and contains a small amount of NaOH as a stabilising agent. The nominal relative particle mass fraction in the suspension is 0.25 %.	Amp.
	NIST-659 - NIST-RM 8010 These materials are for evaluating and calibrating specific types of particle size measuring instruments, including light scattering, electrical zone flow-through counters, optical and scanning electron microscopes, sedimentation systems and wire cloth sieving devices.	
NIST-659	Silicon nitride - Particle size Certified value Particle size 0.2 - 10 µm	set
NIST-1021	Glass beads - Particle size This Standard Reference Material (SRM [®]) is intended for use in the evaluation and calibration of equipment used to measure particle size distributions (PSD) in the 2 µm to 12 µm diameter range. Typical methods for PSD determination would be laser light scattering (LLS), electrical sensing zone (ESZ), and sedimentation. Each unit of NIST-1021 consists of a single bottle containing approximately 4 g of solid spherical soda-lime glass beads. Certified value Particle size 2 - 12 µm	4 g
NIST-1003c	Glass beads - Particle size Certified value Particle size 18.9 - 43.3 µm	28 g
NIST-1004b	Glass beads - Particle size Certified value Particle size 40 - 150 µm	43 g
NIST-1017b	Glass beads - Particle size Certified value Particle size 100 - 400 µm	70 g
NIST-1018b	Glass beads - Particle size Certified value Particle size 220 - 750 µm	87 g
NIST-1019b	Glass beads - Particle size Certified value Particle size 750 - 2450 µm	200 g
NIST-1690	Polystyrene (0.5 wt. % in water) - Particle size Certified value Particle size 0.895 µm	5 mL
NIST-1691	Polystyrene (0.5 wt. % in water) - Particle size Certified value Particle size 0.269 µm	5 mL
NIST-1961	Polystyrene (0.5 wt. % in water) - Particle size Certified value Particle size 29.64 µm	5 mL
NIST-1963a	Polystyrene (0.5 wt. % in water) - Particle size This Standard Reference Material (SRM [®]) is intended for the calibration/validation of particle sizing instruments, including electron microscopes, differential mobility analysers, scanning surface inspection systems, and other light scattering instruments. A unit of NIST-1963a consists of 5 mL of polystyrene spheres in deionized filtered (0.2 µm pore size) water. Certified value Modal sphere diameter 101.8 ± 1.1 nm	5 mL
NIST-1964	Polystyrene (0.5 wt. % in water) - Particle size This Standard Reference Material (SRM [®]) is intended for the calibration/validation of particle sizing instruments, including electron microscopes, differential mobility analysers, scanning surface inspection systems, and other light scattering instruments. A unit of NIST-1964 consists of 5 mL of polystyrene spheres in deionized filtered (0.2 µm pore size) water. Certified value Modal sphere diameter 60.39 ± 0.63 nm	5 mL
NIST-1965	Polystyrene - Particle size This Standard reference material is intended for use as an optical microscopy measurement standard and teaching tool. Certified value Hexagonal array 9.94 µm Unordered clusters 9.89 µm	slide

Code	Product	Unit																												
New NIST-RM 8988	<p>Titanium dioxide powder - Particle size distribution</p> <p>This Reference Material (RM) is intended for use in the evaluation and calibration of equipment used to measure particle size distributions (PSDs) in the 0.1 µm to 0.5 Mm particle diameter range. The PSD values were measured using laser light scattering (LLS) and X-ray disc centrifugation (XDC), two common methods for PSD determination. A unit of RM 8988 consists of a single bottle containing approximately 6 g of rutile titanium dioxide powder. The cumulative mass distribution was determined using both LLS and XDC techniques.</p> <p>For detailed information about the reference values please ask for the certificate.</p>	6 g																												
NIST-1978	<p>Zirconium oxide - Particle size</p> <p>Certified value</p> <p>Particle size 0.33 – 2.19 µm</p>	5 g																												
NIST-1982	<p>Zirconia thermal spray powder - Particle size</p> <p>Certified value</p> <p>Particle size 10 - 150 µm</p>	10 g																												
NIST-1984	<p>Thermal spray powder - Particle size distribution</p> <p>This Standard Reference Material® (SRM®) is primarily intended for use in the calibration of equipment used to measure particle size distributions (PSD) in the 9 µm to 30 µm range. NIST-1984 consists of a single bottle containing approximately 14 g of tungsten carbide/cobalt powder.</p> <p>Certified PSD Values by scanning electron microscopy (SEM)</p> <table border="1"> <thead> <tr> <th>Cumulative Mass Fraction (%)</th> <th>Certified Diameter (µm)</th> <th>Uncertainty (µm)</th> </tr> </thead> <tbody> <tr> <td>10.....</td> <td>10.3.....</td> <td>0.9</td> </tr> <tr> <td>25.....</td> <td>13.2.....</td> <td>0.9</td> </tr> <tr> <td>50.....</td> <td>17.1.....</td> <td>2.2</td> </tr> <tr> <td>75.....</td> <td>21.3.....</td> <td>1.6</td> </tr> <tr> <td>90.....</td> <td>26.3.....</td> <td>0.9</td> </tr> </tbody> </table>	Cumulative Mass Fraction (%)	Certified Diameter (µm)	Uncertainty (µm)	10.....	10.3.....	0.9	25.....	13.2.....	0.9	50.....	17.1.....	2.2	75.....	21.3.....	1.6	90.....	26.3.....	0.9	14 g										
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NIST-1985	<p>Thermal spray powder - Particle size distribution</p> <p>This Standard Reference Material (SRM) is intended primarily for use in the calibration of equipment used to measure particle size distributions (PSD) in the 18 µm to 55 µm range. NIST-1985 consists of a single bottle containing approximately 14 g of tungsten carbide/cobalt powder.</p> <p>Certified PSD Values by scanning electron microscopy (SEM)</p> <table border="1"> <thead> <tr> <th>Cumulative Mass Fraction (%)</th> <th>Certified Diameter (µm)</th> <th>Uncertainty (µm)</th> </tr> </thead> <tbody> <tr> <td>10.....</td> <td>20.2.....</td> <td>1.2</td> </tr> <tr> <td>25.....</td> <td>27.1.....</td> <td>1.7</td> </tr> <tr> <td>50.....</td> <td>36.1.....</td> <td>0.8</td> </tr> <tr> <td>75.....</td> <td>44.2.....</td> <td>2.1</td> </tr> <tr> <td>90.....</td> <td>50.1.....</td> <td>2.5</td> </tr> </tbody> </table>	Cumulative Mass Fraction (%)	Certified Diameter (µm)	Uncertainty (µm)	10.....	20.2.....	1.2	25.....	27.1.....	1.7	50.....	36.1.....	0.8	75.....	44.2.....	2.1	90.....	50.1.....	2.5	14 g										
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NIST-RM 8010	<p>Sand - Particle size</p> <p>Reference value</p> <p>Particle size 30 - 325 µm</p>	3 x 150 g																												
NIST-RM 8011	<p>Gold nanoparticles - Particle size (10 nm diameter)</p> <p>This Reference Material (RM) is intended primarily to evaluate and qualify methodology and/or instrument performance related to the physical/dimensional characterization of nanoscale particles used in pre-clinical biomedical research. The RM may also be useful in the development and evaluation of in vitro assays designed to assess the biological response (e.g., cytotoxicity, hemolysis) of nanomaterials, and for use in interlaboratory test comparisons. NIST-RM 8011 consists of nominally 5 mL of citrate-stabilized Au nanoparticles in an aqueous suspension, supplied in hermetically sealed pre-scored glass ampoules sterilized by gamma irradiation. A unit consists of two 5 mL ampoules. The suspension contains primary particles (monomers) and a small percentage of clusters of primary particles.</p> <p>Reference values</p> <table border="1"> <thead> <tr> <th>Technique</th> <th>Analyte</th> <th>Form</th> <th>Particle Size (nm)</th> </tr> </thead> <tbody> <tr> <td>Atomic Force Microscopy</td> <td>dry, deposited on substrate.....</td> <td></td> <td>8.5 ± 0.3</td> </tr> <tr> <td>Scanning Electron Microscopy</td> <td>dry, deposited on substrate.....</td> <td></td> <td>9.9 ± 0.1</td> </tr> <tr> <td>Transmission Electron Microscopy</td> <td>dry, deposited on substrate.....</td> <td></td> <td>8.9 ± 0.1</td> </tr> <tr> <td>Differential Mobility Analysis</td> <td>dry, aerosol</td> <td></td> <td>11.3 ± 0.1</td> </tr> <tr> <td>Dynamic Light Scattering.....</td> <td>liquid suspension</td> <td></td> <td>13.5 ± 0.1</td> </tr> <tr> <td>Small-Angle X-ray Scattering.....</td> <td>liquid suspension</td> <td></td> <td>9.1 ± 1.8</td> </tr> </tbody> </table> <p>Information values for chemical and electrochemical properties.</p>	Technique	Analyte	Form	Particle Size (nm)	Atomic Force Microscopy	dry, deposited on substrate.....		8.5 ± 0.3	Scanning Electron Microscopy	dry, deposited on substrate.....		9.9 ± 0.1	Transmission Electron Microscopy	dry, deposited on substrate.....		8.9 ± 0.1	Differential Mobility Analysis	dry, aerosol		11.3 ± 0.1	Dynamic Light Scattering.....	liquid suspension		13.5 ± 0.1	Small-Angle X-ray Scattering.....	liquid suspension		9.1 ± 1.8	2 x 5 mL
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Small-Angle X-ray Scattering.....	liquid suspension		9.1 ± 1.8																											

Particles and surface properties

Code	Product	Unit																											
NIST-RM 8012	<p>Gold nanoparticles - Particle size (30 nm diameter)</p> <p>This Reference Material (RM) is intended primarily to evaluate and qualify methodology and/or instrument performance related to the physical/dimensional characterization of nanoscale particles used in pre-clinical biomedical research. The RM may also be useful in the development and evaluation of in vitro assays designed to assess the biological response (e.g., cytotoxicity, hemolysis) of nanomaterials, and for use in interlaboratory test comparisons. NIST-RM 8012 consists of nominally 5 mL of citrate-stabilized Au nanoparticles in an aqueous suspension, supplied in hermetically sealed pre-scored glass ampoules sterilized by gamma irradiation. A unit consists of two 5 mL ampoules. The suspension contains primary particles (monomers) and a small percentage of clusters of primary particles.</p> <p>Reference values</p> <table border="1"> <thead> <tr> <th>Technique</th> <th>Analyte</th> <th>Form Particle Size (nm)</th> </tr> </thead> <tbody> <tr> <td>Atomic Force Microscopy.....</td> <td>dry, deposited on substrate</td> <td>24.9 ± 1.1</td> </tr> <tr> <td>Scanning Electron Microscopy.....</td> <td>dry, deposited on substrate</td> <td>26.9 ± 0.1</td> </tr> <tr> <td>Transmission Electron Microscopy</td> <td>dry, deposited on substrate</td> <td>27.6 ± 2.1</td> </tr> <tr> <td>Differential Mobility Analysis</td> <td>dry, aerosol</td> <td>28.4 ± 1.1</td> </tr> <tr> <td>Dynamic Light Scattering</td> <td>liquid suspension</td> <td></td> </tr> <tr> <td>173° scattering angle (backscatter)</td> <td></td> <td>28.6 ± 0.9</td> </tr> <tr> <td>90° scattering angle</td> <td></td> <td>26.5 ± 3.6</td> </tr> <tr> <td>Small-Angle X-ray Scattering.....</td> <td>liquid suspension</td> <td>24.9 ± 1.2</td> </tr> </tbody> </table> <p>Information values for chemical and electrochemical properties.</p>	Technique	Analyte	Form Particle Size (nm)	Atomic Force Microscopy.....	dry, deposited on substrate	24.9 ± 1.1	Scanning Electron Microscopy.....	dry, deposited on substrate	26.9 ± 0.1	Transmission Electron Microscopy	dry, deposited on substrate	27.6 ± 2.1	Differential Mobility Analysis	dry, aerosol	28.4 ± 1.1	Dynamic Light Scattering	liquid suspension		173° scattering angle (backscatter)		28.6 ± 0.9	90° scattering angle		26.5 ± 3.6	Small-Angle X-ray Scattering.....	liquid suspension	24.9 ± 1.2	2 x 5 mL
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Small-Angle X-ray Scattering.....	liquid suspension	24.9 ± 1.2																											
NIST-RM 8013	<p>Gold nanoparticles - Particle size (60 nm diameter)</p> <p>This Reference Material (RM) is intended primarily to evaluate and qualify methodology and/or instrument performance related to the physical/dimensional characterization of nanoscale particles used in pre-clinical biomedical research. The RM may also be useful in the development and evaluation of in vitro assays designed to assess the biological response (e.g., cytotoxicity, hemolysis) of nanomaterials, and for use in interlaboratory test comparisons. NIST-RM 8013 consists of nominally 5 mL of citrate-stabilized Au nanoparticles in an aqueous suspension, supplied in hermetically sealed pre-scored glass ampoules sterilized by gamma irradiation. A unit consists of two 5 mL ampoules. The suspension contains primary particles (monomers) and a small percentage of clusters of primary particles.</p> <p>Reference values</p> <table border="1"> <thead> <tr> <th>Technique</th> <th>Analyte</th> <th>Form Particle Size (nm)</th> </tr> </thead> <tbody> <tr> <td>Atomic Force Microscopy.....</td> <td>dry, deposited on substrate</td> <td>55.4 ± 0.3</td> </tr> <tr> <td>Scanning Electron Microscopy.....</td> <td>dry, deposited on substrate</td> <td>54.9 ± 0.4</td> </tr> <tr> <td>Transmission Electron Microscopy</td> <td>dry, deposited on substrate</td> <td>56.0 ± 0.5</td> </tr> <tr> <td>Differential Mobility Analysis</td> <td>dry, aerosol</td> <td>65.3 ± 1.5</td> </tr> <tr> <td>Dynamic Light Scattering</td> <td>liquid suspension</td> <td></td> </tr> <tr> <td>173° scattering angle (backscatter)</td> <td></td> <td>56.6 ± 1.4</td> </tr> <tr> <td>90° scattering angle</td> <td></td> <td>55.3 ± 8.3</td> </tr> <tr> <td>Small-Angle X-ray Scattering.....</td> <td>liquid suspension</td> <td>53.2 ± 5.3</td> </tr> </tbody> </table> <p>Information values for chemical and electrochemical properties.</p>	Technique	Analyte	Form Particle Size (nm)	Atomic Force Microscopy.....	dry, deposited on substrate	55.4 ± 0.3	Scanning Electron Microscopy.....	dry, deposited on substrate	54.9 ± 0.4	Transmission Electron Microscopy	dry, deposited on substrate	56.0 ± 0.5	Differential Mobility Analysis	dry, aerosol	65.3 ± 1.5	Dynamic Light Scattering	liquid suspension		173° scattering angle (backscatter)		56.6 ± 1.4	90° scattering angle		55.3 ± 8.3	Small-Angle X-ray Scattering.....	liquid suspension	53.2 ± 5.3	2 x 5 mL
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AEA1001	<p>Aerosol fibre analogue shape standard (aqueous suspension)</p> <p>Reference values: Particles per vial 1.0×10^7, Particle length 3.09 µm, Particle width 1.67 µm, Particle depth 0.96 µm, Indicative aerodynamic diameter – motion perpendicular to major axis 2.89 µm, Indicative aerodynamic diameter – motion parallel to major axis 3.14 µm.</p>	10 mL																											
NIST-RM 8631a	<p>Medium Test Dust (MTD)</p> <p>A unit of Reference Material NIST-RM 8631A, an ISO Medium Test Dust (MTD), consists of 20 g of a natural mineral dust that is heterogeneous in composition and polydisperse with respect to size. RM 8631a is intended to be used as a secondary material for calibrating particle sizing instruments, especially optical particle counters, when used in conjunction with either of two published standard methods. RM 8631a can be used in conjunction with either the National Fluid Power Association method (NFPA) method NFPA/T2.9.11 R1-1998 "Hydraulic Fluid Power - Calibration of Liquid Automatic Particle Counters" or the International Standards Organization method ISO 11171:1999 "Hydraulic Fluid Power - Calibration of Liquid Automatic Particle Counters". Using either of these two methods, the particle concentration of RM 8631a at each diameter will be determined by calibration against NIST Standard Reference Material NIST-2806A, Medium Test Dust (MTD) in Hydraulic Fluid.</p> <p>NIST-RM 8632</p> <p>For use in preparing suspensions in other types of oil, further information on request. This material is intended for use in calibrating the response of particle sizing instrumentation, including optical counters, in accordance with National Fluid Power Association (NFPA) and ISO standard methods for determining particle contamination in oils.</p>	20 g																											
NIST-RM 8632	<p>Ultrafine Test Dust</p>	20 g																											

Particle size calibration standards from Whitehouse Scientific

Whitehouse Scientific has been producing precision glass microspheres for calibration for 25 years and is the highest ranking European certification laboratory for primary methods of particle size analysis. Having filled over 1 million bottles using a unique 100 stage spinning riffler system, they are now the world's leading manufacturer of single-shot glass microsphere standards. The references, nearly all NIST traceable range in size from 0.1µm - 5.0mm and are available as single sizes or broad distribution standards.

Whether calibrating a particle sizing instrument or any aperture in the range 0.1 - 10,000 microns, Whitehouse Scientific has a standard for every application.

Code	Product	Unit
Polydisperse particle standards		
WS-PS180	Polydisperse particle standard - Nominal size: 0.1 - 1 µm	0.01 g
WS-PS181	Polydisperse particle standard - Nominal size: 0.1 - 1 µm	0.02 g
WS-PS190	Polydisperse particle standard - Nominal size: 1 - 10 µm	0.025 g
WS-PS191	Polydisperse particle standard - Nominal size: 1 - 10 µm	0.05 g
WS-PS192	Polydisperse particle standard - Nominal size: 1 - 10 µm	0.10 g
WS-PS193	Polydisperse particle standard - Nominal size: 1 - 10 µm	0.25 g
WS-PS194	Polydisperse particle standard - Nominal size: 1 - 10 µm	0.50 g
WS-PS200	Polydisperse particle standard - Nominal size: 3 - 30 µm	0.025 g
WS-PS201	Polydisperse particle standard - Nominal size: 3 - 30 µm	0.05 g
WS-PS202	Polydisperse particle standard - Nominal size: 3 - 30 µm	0.10 g
WS-PS203	Polydisperse particle standard - Nominal size: 3 - 30 µm	0.25 g
WS-PS204	Polydisperse particle standard - Nominal size: 3 - 30 µm	0.50 g
WS-PS205	Polydisperse particle standard - Nominal size: 3 - 30 µm	1 g
WS-PS211	Polydisperse particle standard - Nominal size: 10 - 100 µm	0.05 g
WS-PS212	Polydisperse particle standard - Nominal size: 10 - 100 µm	0.10 g
WS-PS213	Polydisperse particle standard - Nominal size: 10 - 100 µm	0.25 g
WS-PS214	Polydisperse particle standard - Nominal size: 10 - 100 µm	0.50 g
WS-PS215	Polydisperse particle standard - Nominal size: 10 - 100 µm	1 g
WS-PS222	Polydisperse particle standard - Nominal size: 50 - 350 µm	0.10 g
WS-PS223	Polydisperse particle standard - Nominal size: 50 - 350 µm	0.25 g
WS-PS224	Polydisperse particle standard - Nominal size: 50 - 350 µm	0.50 g
WS-PS225	Polydisperse particle standard - Nominal size: 50 - 350 µm	1 g
WS-PS226	Polydisperse particle standard - Nominal size: 50 - 350 µm	2.5 g
WS-PS227	Polydisperse particle standard - Nominal size: 50 - 350 µm	5 g
WS-PS232	Polydisperse particle standard - Nominal size: 150 - 650 µm	0.25 g
WS-PS233	Polydisperse particle standard - Nominal size: 150 - 650 µm	0.50 g
WS-PS234	Polydisperse particle standard - Nominal size: 150 - 650 µm	1 g
WS-PS235	Polydisperse particle standard - Nominal size: 150 - 650 µm	2.5 g
WS-PS236	Polydisperse particle standard - Nominal size: 150 - 650 µm	5 g
WS-PS237	Polydisperse particle standard - Nominal size: 150 - 650 µm	7 g
WS-PS240	Polydisperse particle standard - Nominal size: 500 - 2000 µm	7 g

NIST traceable monodisperse particle standards

WS-MS0009	Monodisperse particle standard (9.18 µm)	0.1 g
WS-MS0012	Monodisperse particle standard (11.58 µm)	0.1 g
WS-MS0023	Monodisperse particle standard (22.81 µm)	0.1 g
WS-MS0026	Monodisperse particle standard (25.6 µm)	0.1 g
WS-MS0028	Monodisperse particle standard (28.41 µm)	0.15 g
WS-MS0031	Monodisperse particle standard (31.33 µm)	0.15 g
WS-MS0036	Monodisperse particle standard (35.65 µm)	0.2 g
WS-MS0037	Monodisperse particle standard (37.36 µm)	0.2 g
WS-MS0038	Monodisperse particle standard (38.38 µm)	0.2 g
WS-MS0040	Monodisperse particle standard (40.15 µm)	0.2 g
WS-MS0042	Monodisperse particle standard (42.68 µm)	0.2 g
WS-MS0049	Monodisperse particle standard (49.21 µm)	0.2 g
WS-MS0053	Monodisperse particle standard (52.47 µm)	0.2 g
WS-MS0056	Monodisperse particle standard (56.28 µm)	0.2 g
WS-MS0060	Monodisperse particle standard (59.63 µm)	0.2 g
WS-MS0064	Monodisperse particle standard (63.86 µm)	0.2 g
WS-MS0065	Monodisperse particle standard (65.02 µm)	0.2 g

Particles and surface properties

Code	Product	Unit
WS-MS0066	Monodisperse particle standard (66.29 µm)	0.2 g
WS-MS0071	Monodisperse particle standard (70.89 µm)	0.2 g
WS-MS0074	Monodisperse particle standard (73.8 µm)	0.2 g
WS-MS0076	Monodisperse particle standard (76.39 µm)	0.2 g
WS-MS0083	Monodisperse particle standard (83.43 µm)	0.2 g
WS-MS0090	Monodisperse particle standard (89.8 µm)	0.2 g
WS-MS0091	Monodisperse particle standard (91.21 µm)	0.2 g
WS-MS0114	Monodisperse particle standard (114.4 µm)	0.3 g
WS-MS0128	Monodisperse particle standard (127.5 µm)	0.3 g
WS-MS0156	Monodisperse particle standard (155.8 µm)	0.3 g
WS-MS0177	Monodisperse particle standard (177 µm)	0.3 g
WS-MS0180	Monodisperse particle standard (180 µm)	0.3 g
WS-MS0193	Monodisperse particle standard (192.8 µm)	0.4 g
WS-MS0197	Monodisperse particle standard (197.3 µm)	0.4 g
WS-MS0201	Monodisperse particle standard (200.9 µm)	0.4 g
WS-MS0210	Monodisperse particle standard (210.6 µm)	0.4 g
WS-MS0225	Monodisperse particle standard (224.8 µm)	0.4 g
WS-MS0236	Monodisperse particle standard (236.2 µm)	0.5 g
WS-MS0259	Monodisperse particle standard (258.6 µm)	0.6 g
WS-MS0269	Monodisperse particle standard (268.5 µm)	0.6 g
WS-MS0292	Monodisperse particle standard (292.5 µm)	0.8 g
WS-MS0298	Monodisperse particle standard (297.9 µm)	0.8 g
WS-MS0305	Monodisperse particle standard (304.6 µm)	0.8 g
WS-MS0315	Monodisperse particle standard (315.3 µm)	1 g
WS-MS0362	Monodisperse particle standard (361.6 µm)	1 g
WS-MS0406	Monodisperse particle standard (405.9 µm)	1.5 g
WS-MS0451	Monodisperse particle standard (451 µm)	2 g
WS-MS0555	Monodisperse particle standard (555 µm)	2.5 g
WS-MS0589	Monodisperse particle standard (589 µm)	2.5 g

Image analysis standards

WS-XX015	Image analysis standard - Calibration range: 50 - 250 µm	50 g
WS-XX025	Image analysis standard - Calibration range: 170 - 710 µm	100 g
WS-XX030	Image analysis standard - Calibration range: 500 - 2000 µm	200 g
WS-XX035	Image analysis standard - Calibration range: 1400 - 5000 µm	500 g

NIST traceable sieve standards

WS-SS391	Sieve standard - For sieve size: 20 µm Mesh 635 Calibration range..... 18.8 - 23.7 µm	5 x 0.8 g
WS-SS392	Sieve standard - For sieve size: 25 µm Mesh 500 Calibration range..... 21.7 - 30.2 µm	5 x 0.8 g
WS-SS393	Sieve standard - For sieve size: 32 µm Mesh 450 Calibration range..... 27.8 - 34.1 µm	1 x 1 g
WS-SS394	Sieve standard - For sieve size: 36, 38, 40 µm Mesh 400 Calibration range..... 33.5 - 41.6 µm	5 x 1 g
WS-SS395	Sieve standard - For sieve size: 45, 50 µm Mesh 325 Calibration range..... 42.0 - 50.8 µm	5 x 1 g
WS-SS396	Sieve standard - For sieve size: 53, 56 µm Mesh 270 Calibration range..... 48.4 - 59.5 µm	5 x 1 g
WS-SS397	Sieve standard - For sieve size: 63 µm Mesh 230 Calibration range..... 56.6 - 70.4 µm	5 x 1 g
WS-SS398	Sieve standard - For sieve size: 71, 75, 80 µm Mesh 200 Calibration range..... 67.1 - 82.8 µm	5 x 1 g

Particles and surface properties

Code	Product	Unit
WS-SS399	Sieve standard - For sieve size: 90 µm Mesh170 Calibration range..... 78.8 - 97.6 µm	5 x 1 g
WS-SS400	Sieve standard - For sieve size: 100, 106, 112 µm Mesh140 Calibration range.....91.4 - 117 µm	5 x 1 g
WS-SS401	Sieve standard - For sieve size: 125 µm Mesh120 Calibration range..... 112 - 139 µm	5 x 1 g
WS-SS402	Sieve standard - For sieve size: 140, 150, 160 µm Mesh100 Calibration range..... 134 - 167 µm	5 x 2.5 g
WS-SS403	Sieve standard - For sieve size: 180 µm Mesh80 Calibration range..... 161 - 199 µm	5 x 2.5 g
WS-SS404	Sieve standard - For sieve size: 200, 212, 224 µm Mesh70 Calibration range..... 191 - 237 µm	5 x 2.5 g
WS-SS405	Sieve standard - For sieve size: 250, 280 µm Mesh60 Calibration range.....226 - 281 µm	5 x 2.5 g
WS-SS406	Sieve standard - For sieve size: 300, 315 µm Mesh50 Calibration range.....270 - 333 µm	5 x 2.5 g
WS-SS407	Sieve standard - For sieve size: 355 µm Mesh45 Calibration range..... 322 - 398 µm	5 x 2.5 g
WS-SS408	Sieve standard - For sieve size: 400, 425, 450 µm Mesh40 Calibration range.....377 - 470 µm	5 x 2.5 g
WS-SS409	Sieve standard - For sieve size: 500 µm Mesh35 Calibration range..... 440 - 557 µm	5 x 2.5 g
WS-SS410	Sieve standard - For sieve size: 560, 600, 630 µm Mesh30 Calibration range..... 526 - 657 µm	5 x 2.5 g
WS-SS411	Sieve standard - For sieve size: 710 µm Mesh25 Calibration range.....658 - 809 µm	5 x 2.5 g
WS-SS412	Sieve standard - For sieve size: 800, 850, 900 µm Mesh20 Calibration range..... 774 - 951 µm	5 x 2.5 g
WS-SS413	Sieve standard - For sieve size: 1000 µm Mesh18 Calibration range.....910 - 1106 µm	5 x 7 g
WS-SS414	Sieve standard - For sieve size: 1120, 1180, 1250 µm Mesh16 Calibration range..... 1091- 1335 µm	5 x 10 g
WS-SS415	Sieve standard - For sieve size: 1400, 1550 µm Mesh14 Calibration range..... 1292 - 1609 µm	5 x 15 g
WS-SS416	Sieve standard - For sieve size: 1600, 1700, 1800 µm Mesh12 Calibration range..... 1515 - 1866 µm	5 x 15 g
WS-SS417	Sieve standard - For sieve size: 2000 µm Mesh10 Calibration range.....1836 - 2236 µm	5 x 20 g
WS-SS418	Sieve standard - For sieve size: 2240, 2360, 2500 µm Mesh8 Calibration range.....2148 - 2661 µm	5 x 20 g
WS-SS419	Sieve standard - For sieve size: 2800, 3150 µm Mesh7 Calibration range.....2555 - 3232 µm	5 x 25 g
WS-SS420	Sieve standard - For sieve size: 3350, 3550 µm Mesh6 Calibration range.....3072 - 3783 µm	5 x 25 g

General purpose glass microspheres

WS-GP0042	General purpose glass microspheres - Sieve fraction: 38 - 45 µm	100 g
WS-GP0049	General purpose glass microspheres - Sieve fraction: 45 - 53 µm	100 g
WS-GP0069	General purpose glass microspheres - Sieve fraction: 63 - 75 µm	100 g
WS-GP0083	General purpose glass microspheres - Sieve fraction: 75 - 90 µm	100 g
WS-GP0098	General purpose glass microspheres - Sieve fraction: 90 - 106 µm	100 g
WS-GP0116	General purpose glass microspheres - Sieve fraction: 106 - 125 µm	200 g
WS-GP0138	General purpose glass microspheres - Sieve fraction: 125 - 150 µm	200 g
WS-GP0165	General purpose glass microspheres - Sieve fraction: 150 - 180 µm	200 g
WS-GP0196	General purpose glass microspheres - Sieve fraction: 180 - 212 µm	200 g

Particles and surface properties

Code	Product	Unit
WS-GP0231	General purpose glass microspheres - Sieve fraction: 212 - 250 µm	200 g
WS-GP0275	General purpose glass microspheres - Sieve fraction: 250 - 300 µm	200 g
WS-GP0328	General purpose glass microspheres - Sieve fraction: 300 - 355 µm	200 g
WS-GP0335	General purpose glass microspheres - Sieve fraction: 315 - 355 µm	200 g
WS-GP0375	General purpose glass microspheres - Sieve fraction: 350 - 400 µm	200 g
WS-GP0390	General purpose glass microspheres - Sieve fraction: 355 - 425 µm	200 g
WS-GP0463	General purpose glass microspheres - Sieve fraction: 425 - 500 µm	200 g
WS-GP0475	General purpose glass microspheres - Sieve fraction: 450 - 500 µm	200 g
WS-GP0530	General purpose glass microspheres - Sieve fraction: 500 - 560 µm	200 g
WS-GP0550	General purpose glass microspheres - Sieve fraction: 500 - 600 µm	200 g
WS-GP0580	General purpose glass microspheres - Sieve fraction: 560 - 600 µm	200 g
WS-GP0615	General purpose glass microspheres - Sieve fraction: 600 - 630 µm	200 g
WS-GP0650	General purpose glass microspheres - Sieve fraction: 600 - 710 µm	200 g
WS-GP0780	General purpose glass microspheres - Sieve fraction: 710 - 850 µm	200 g
WS-GP0925	General purpose glass microspheres - Sieve fraction: 850 - 1000 µm	200 g
WS-GP1090	General purpose glass microspheres - Sieve fraction: 1000 - 1180 µm	400 g
WS-GP1150	General purpose glass microspheres - Sieve fraction: 1120 - 1180 µm	400 g
WS-GP1215	General purpose glass microspheres - Sieve fraction: 1180 - 1250 µm	400 g
WS-GP1325	General purpose glass microspheres - Sieve fraction: 1250 - 1400 µm	400 g
WS-GP1500	General purpose glass microspheres - Sieve fraction: 1400 - 1600 µm	400 g
WS-GP1550	General purpose glass microspheres - Sieve fraction: 1400 - 1700 µm	400 g
WS-GP1700	General purpose glass microspheres - Sieve fraction: 1600 - 1800 µm	400 g
WS-GP1750	General purpose glass microspheres - Sieve fraction: 1700 - 1800 µm	400 g
WS-GP1900	General purpose glass microspheres - Sieve fraction: 1800 - 2000 µm	400 g
WS-GP2200	General purpose glass microspheres - Sieve fraction: 2000 - 2240 µm	400 g
WS-GP3000	General purpose glass microspheres - Sieve fraction: 2800 - 3200 µm	400 g
WS-GP3455	General purpose glass microspheres - Sieve fraction: 3360 - 3550 µm	400 g
WS-GP3775	General purpose glass microspheres - Sieve fraction: 3350 - 4000 µm	400 g

General purpose basalt microspheres

WS-BM0083	General purpose basalt microspheres - Sieve fraction: 75 - 90 µm	100 g
WS-BM0098	General purpose basalt microspheres - Sieve fraction: 90 - 106 µm	100 g
WS-BM0116	General purpose basalt microspheres - Sieve fraction: 106 - 125 µm	100 g
WS-BM0138	General purpose basalt microspheres - Sieve fraction: 125 - 150 µm	100 g
WS-BM0165	General purpose basalt microspheres - Sieve fraction: 150 - 180 µm	100 g
WS-BM0196	General purpose basalt microspheres - Sieve fraction: 180 - 212 µm	100 g
WS-BM0231	General purpose basalt microspheres - Sieve fraction: 212 - 250 µm	100 g
WS-BM0275	General purpose basalt microspheres - Sieve fraction: 250 - 300 µm	100 g
WS-BM0328	General purpose basalt microspheres - Sieve fraction: 300 - 355 µm	100 g
WS-BM0390	General purpose basalt microspheres - Sieve fraction: 355 - 425 µm	100 g
WS-BM0463	General purpose basalt microspheres - Sieve fraction: 425 - 500 µm	100 g
WS-BM0550	General purpose basalt microspheres - Sieve fraction: 500 - 600 µm	100 g
WS-BM0650	General purpose basalt microspheres - Sieve fraction: 600 - 710 µm	100 g
WS-BM0780	General purpose basalt microspheres - Sieve fraction: 710 - 850 µm	100 g
WS-BM0925	General purpose basalt microspheres - Sieve fraction: 800 - 1000 µm	100 g
WS-BM1090	General purpose basalt microspheres - Sieve fraction: 1000 - 1200 µm	100 g
WS-BM1300	General purpose basalt microspheres - Sieve fraction: 1200 - 1400 µm	100 g
WS-BM1500	General purpose basalt microspheres - Sieve fraction: 1400 - 1600 µm	100 g
WS-BM1700	General purpose basalt microspheres - Sieve fraction: 1600 - 1800 µm	100 g
WS-BM1900	General purpose basalt microspheres - Sieve fraction: 1800 - 2000 µm	100 g
WS-BM2200	General purpose basalt microspheres - Sieve fraction: 2000 - 2400 µm	100 g

Code	Product	Unit
Surface area		
BCR-169	alpha-Alumina - Specific surface area (BET) Certified value Specific surface area (BET)..... 0.104 m ² /g	60 g
BCR-170	alpha-Alumina - Specific surface area (BET) Certified value Specific surface area (BET)..... 1.05 m ² /g	60 g
BCR-171	Alumina - Specific surface area (BET) Certified value Specific surface area (BET)..... 2.95 m ² /g	50 g
BCR-172	Quartz - Specific surface area (BET) Certified value Specific surface area (BET)..... 2.56 m ² /g	10 g
BCR-173	Titania - Specific surface area (BET) Certified value Specific surface area (BET)..... 8.23 m ² /g	46 g
BCR-175	Tungsten - Specific surface area (BET) Certified value Specific surface area (BET)..... 0.181 m ² /g	200 g
NIST-1900	Silicon nitride - Specific surface area Intended for use in the calibration of BET instruments used to measure specific surface area (SSA) in the range 0.1 m ² /g to 1000 m ² /g. Certified values Specific surface area (BET) multipoint 2.85 m ² /g Specific surface area (BET) single point 2.79 m ² /g	4 g
Micropore volume and width		
BCR-704	Faujasite type zeolite Adsorption of argon at the temperature of liquid argon (87K) on a microporous material (faujasite type zeolite) according to DIN 66135-4.	10 g
BCR-705	Linde type A zeolite Adsorption of argon at the temperature of liquid argon (87 K) on a microporous material (Linde type A zeolite) according to DIN 66135-4.	10 g
BAM-PM-101 - 104 and ERM-FD107 These reference materials are intended for the calibration and checking of instruments for the determination of the specific surface area, the specific pore volume, and the pore radius (pore width) by means of the gas adsorption method according DIN 66131 (replaced by DIN ISO 9277), DIN 66134, and DIN 66135-Part 4.		
BAM-PM-101	Quartz powder with small specific surface area CRMs for the gas adsorption method Sorptive: Krypton BET-Specific surface area (m ² /g)..... 0,177 ± 0,014	10 g
BAM-PM-102	Alumina powder with small specific surface area CRMs for the gas adsorption method Sorptive: Nitrogen BET-Specific surface area (m ² /g)..... 5.41 ± 0.24	10 g
BAM-PM-104	Mesoporous alumina powder CRMs for the gas adsorption method Sorptive: Nitrogen BET-Specific surface area (m ² /g)..... 79.8 ± 2.0 Specific pore volume (cm ³ /g) p/po=0.99..... 0.210 ± 0.009 Mean pore radius (nm) 5.31 ± 0.24 Most frequent pore radius (nm) 3.23 ± 0.23	10 g
ERM-FD107	Microporous zeolite (Faujasite type)(BAM-P107) Pellets CRMs for the gas adsorption method Sorptive: Nitrogen Specific micropore volume (cm ³ /g)..... 0.217 ± 0.002 Median pore width (nm) 0.86 ± 0.02	10 g

Particles and surface properties

Code	Product	Unit																																			
ERM-FD120	<p>Porous alumina - beads (BAM-PM-120)</p> <p>This reference material is intended for the calibration and checking of porosimeters by means of the whole pressure volume curves of the Hg intrusion method.</p> <p>Certified values</p> <table> <tr> <td>Pore volume at 100 MPa</td> <td>545.0 ± 12.2 mm³/g</td> <td>Pore volume at 395 MPa</td> <td>548.1 ± 13.1 mm³/g</td> </tr> <tr> <td>Pore volume at 195 MPa</td> <td>546.7 ± 12.7 mm³/g</td> <td>Mean pore diameter d₅₀</td> <td>228.0 ± 5.9 nm</td> </tr> <tr> <td>Pore volume at 200 MPa</td> <td>546.8 ± 12.7 mm³/g</td> <td>Most frequent pore diameter d_{p,m}</td> <td>232.2 ± 8.8 nm</td> </tr> </table>	Pore volume at 100 MPa	545.0 ± 12.2 mm ³ /g	Pore volume at 395 MPa	548.1 ± 13.1 mm ³ /g	Pore volume at 195 MPa	546.7 ± 12.7 mm ³ /g	Mean pore diameter d ₅₀	228.0 ± 5.9 nm	Pore volume at 200 MPa	546.8 ± 12.7 mm ³ /g	Most frequent pore diameter d _{p,m}	232.2 ± 8.8 nm	15 g																							
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ERM-FD121	<p>Porous glass - beads (BAM-PM-121)</p> <p>This reference material is intended for the calibration and checking of porosimeters by means of the whole pressure volume curves of the Hg intrusion method.</p> <p>Certified values</p> <table> <tr> <td>Pore volume at 100 MPa</td> <td>425.0 ± 47.1 mm³/g</td> <td>Pore volume at 395 MPa</td> <td>624.6 ± 13.4 mm³/g</td> </tr> <tr> <td>Pore volume at 195 MPa</td> <td>621.9 ± 12.9 mm³/g</td> <td>Mean pore diameter d₅₀</td> <td>15.1 ± 0.2 nm</td> </tr> <tr> <td>Pore volume at 200 MPa</td> <td>621.9 ± 12.9 mm³/g</td> <td>Most frequent pore diameter d_{p,m}</td> <td>15.3 ± 0.2 nm</td> </tr> </table>	Pore volume at 100 MPa	425.0 ± 47.1 mm ³ /g	Pore volume at 395 MPa	624.6 ± 13.4 mm ³ /g	Pore volume at 195 MPa	621.9 ± 12.9 mm ³ /g	Mean pore diameter d ₅₀	15.1 ± 0.2 nm	Pore volume at 200 MPa	621.9 ± 12.9 mm ³ /g	Most frequent pore diameter d _{p,m}	15.3 ± 0.2 nm	12 g																							
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ERM-FD122	<p>Porous glass - beads (BAM-PM-122)</p> <p>This reference material is intended for the calibration and checking of porosimeters by means of the whole pressure volume curves of the Hg intrusion method.</p> <p>Certified values</p> <table> <tr> <td>Pore volume at 100 MPa</td> <td>919.7 ± 16.8 mm³/g</td> <td>Pore volume at 395 MPa</td> <td>924.4 ± 17.2 mm³/g</td> </tr> <tr> <td>Pore volume at 195 MPa</td> <td>922.5 ± 17.5 mm³/g</td> <td>Mean pore diameter d₅₀</td> <td>139.0 ± 3.7 nm</td> </tr> <tr> <td>Pore volume at 200 MPa</td> <td>922.6 ± 17.5 mm³/g</td> <td>Most frequent pore diameter d_{p,m}</td> <td>140.2 ± 3.9 nm</td> </tr> </table>	Pore volume at 100 MPa	919.7 ± 16.8 mm ³ /g	Pore volume at 395 MPa	924.4 ± 17.2 mm ³ /g	Pore volume at 195 MPa	922.5 ± 17.5 mm ³ /g	Mean pore diameter d ₅₀	139.0 ± 3.7 nm	Pore volume at 200 MPa	922.6 ± 17.5 mm ³ /g	Most frequent pore diameter d _{p,m}	140.2 ± 3.9 nm	10 g																							
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BAM-P127	<p>Porous alumina - pellets of alumina</p> <p>This reference material is intended for the calibration and checking of porosimeters by means of the whole pressure volume curves of the Hg intrusion method.</p> <p>Certified values</p> <table> <tr> <td>Pore volume at 50 MPa</td> <td>69.4 ± 8.0 mm³/g</td> <td>Pore volume at 395 MPa</td> <td>638.6 ± 21.6 mm³/g</td> </tr> <tr> <td>Pore volume at 100 MPa</td> <td>625.4 ± 13.6 mm³/g</td> <td>Mean pore diameter d₅₀</td> <td>24.2 ± 1.0 nm</td> </tr> <tr> <td>Pore volume at 195 MPa</td> <td>637.1 ± 14.4 mm³/g</td> <td>Most frequent pore diameter d_{p,m}</td> <td>23.9 ± 2.8 nm</td> </tr> </table>	Pore volume at 50 MPa	69.4 ± 8.0 mm ³ /g	Pore volume at 395 MPa	638.6 ± 21.6 mm ³ /g	Pore volume at 100 MPa	625.4 ± 13.6 mm ³ /g	Mean pore diameter d ₅₀	24.2 ± 1.0 nm	Pore volume at 195 MPa	637.1 ± 14.4 mm ³ /g	Most frequent pore diameter d _{p,m}	23.9 ± 2.8 nm	10 g																							
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NIST-1917	<p>Alumina - Specific pore volume</p> <p>This SRM[®]/CRM jointly developed and certified by NIST and BAM is intended for use in calibrating and monitoring the performance of mercury porosimeters. The SRM[®]/CRM unit consists of a single bottle containing approximately 10 g of alumina beads.</p> <p>Certified properties:</p> <p>A) Pressure-volume curve (mercury intrusion curve) between 0.1 MPa and 400 MPa B) Diameter-volume curve (cumulative pore volume curve) between 3.7 nm and 14708 nm C) Pore volume values at selected intrusion pressure points; (ii) Values for the pore diameter</p> <p>Certified pore volume values at selected intrusion pressures and certified pore diameter</p> <table> <thead> <tr> <th>Property</th> <th>x</th> <th>U</th> <th>2s</th> <th>Unit</th> </tr> </thead> <tbody> <tr> <td>Specific Pore Volume at 50 MPa</td> <td>69.4</td> <td>1.5</td> <td>8.0</td> <td>mm³ g⁻¹</td> </tr> <tr> <td>Specific Pore Volume at 100 MPa</td> <td>625.4</td> <td>2.5</td> <td>13.6</td> <td>mm³ g⁻¹</td> </tr> <tr> <td>Specific Pore Volume at 195 MPa</td> <td>637.1</td> <td>2.6</td> <td>14.4</td> <td>mm³ g⁻¹</td> </tr> <tr> <td>Specific Pore Volume at 395 MPa</td> <td>638.6</td> <td>3.9</td> <td>21.6</td> <td>mm³ g⁻¹</td> </tr> <tr> <td>Mean Pore Diameter d₅₀</td> <td>24.2</td> <td>0.2</td> <td>1.0</td> <td>nm</td> </tr> <tr> <td>Most Frequent Pore Diameter d_{p,m}</td> <td>23.9</td> <td>0.5</td> <td>2.8</td> <td>nm</td> </tr> </tbody> </table> <p>x - mean of the laboratory means (certified value) U - expanded uncertainty (coverage factor 2) s - standard deviation of the certified value</p> <p>Note: all certified pore volumes are normalized values V_p = V_p(pHg) - V_p(0.1 MPa)</p>	Property	x	U	2s	Unit	Specific Pore Volume at 50 MPa	69.4	1.5	8.0	mm ³ g ⁻¹	Specific Pore Volume at 100 MPa	625.4	2.5	13.6	mm ³ g ⁻¹	Specific Pore Volume at 195 MPa	637.1	2.6	14.4	mm ³ g ⁻¹	Specific Pore Volume at 395 MPa	638.6	3.9	21.6	mm ³ g ⁻¹	Mean Pore Diameter d ₅₀	24.2	0.2	1.0	nm	Most Frequent Pore Diameter d _{p,m}	23.9	0.5	2.8	nm	10 g
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NIST-1918	<p>Silica-alumina - Specific pore volume</p> <p>This Standard Reference Material[®] (SRM[®]) is intended for use in the calibration of mercury porosimeter intrusion analytical instruments. A unit of NIST-1918 consists of one vial containing approximately 12 g of an extruded silica-alumina compound.</p> <p>Certified values</p> <table> <tr> <td>Mean Pore Diameter</td> <td>8.847 ± 0.363 nm</td> </tr> <tr> <td>Median Pore Diameter</td> <td>8.503 ± 0.218 nm</td> </tr> <tr> <td>Total Intruded Volume</td> <td>0.547 ± 0.018 mm³ /g</td> </tr> </table>	Mean Pore Diameter	8.847 ± 0.363 nm	Median Pore Diameter	8.503 ± 0.218 nm	Total Intruded Volume	0.547 ± 0.018 mm ³ /g	12 g																													
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Code	Product	Unit
Particle flow		
BCR-116	Limestone powders The flow of powders or granulated materials under the force of gravity affects the design and operation of silos used for their bulk storage. The European Federation of Chemical Engineering (EFCE) therefore developed a test method, based on the Jenike Shear Cell, to determine the shear strength of powders under different compaction and loading conditions. The complexity of this method is such that errors due to poor technique can easily arise. This CRM has therefore been produced with which laboratories can verify both their equipment and experimental technique. It is certified for shear stress as a function of normal applied stress for four different powder compaction stresses.	3.2 kg
Microhardness		
	NIST-1893 - NIST-2830 These materials are intended for use in calibrating and checking the performance of microhardness testers and may be used in conjunction with ASTM E384.	
NIST-1894a	Bright copper - Hardness (Vickers) This Standard Reference Material [®] (SRM [®]) is intended primarily for use in calibrating Vickers-type microhardness testers and is certified for mean Vickers hardness values (HV) at loads of 0.245 N, 0.49 N, and 0.98 N (0.025 kgf, 0.050 kgf, and 0.100 kgf, respectively). NIST-1894a consists of a 1.35 cm square test block of electrodeposited bright copper, approximately 1750 µm thick, on an AISI 1010 steel substrate, mounted in a thermosetting epoxy. Five indentations were made on the SRM's polished surface for each load. Hardness values are reported in Gigapascal (GPa) and kgf/mm ² . The SRM [®] was individually measured and bears a serial number imprinted on the side of the epoxy mount.	Each
NIST-1895	Bright nickel - Hardness (Knoop) Load 0.245, 0.490, 0.981N Certified value Hardness (nominal) 600 kg/mm ²	Each
NIST-1896a	Bright nickel - Hardness (Vickers) Load 0.245, 0.490, 0.981N Certified value Hardness (nominal) 600 kg/mm ²	Each
NIST-1905	Bright nickel - Hardness (Knoop) Load 2.943 Certified value Hardness (nominal) 600 kg/mm ²	Each
NIST-1906	Bright nickel - Hardness (Knoop) Load 4.905N Certified value Hardness (nominal) 600 kg/mm ²	Each
NIST-1907	Bright nickel - Hardness (Knoop) Load 9.81N Certified value Hardness (nominal) 600 kg/mm ²	Each
NIST-1908	Bright nickel - Hardness (Vickers) This Standard Reference Material [®] (SRM [®]) is intended primarily for use in calibrating Vickers-type microhardness testers and is certified for mean Vickers hardness values (HV) at a load of 2.943 N (0.300 kgf). NIST-1908 consists of a 1.35 cm square test block of electrodeposited bright nickel, approximately 750 µm thick, on an AISI 1010 steel substrate, mounted in a thermosetting epoxy. Five indentations were made on the polished surface of the SRM [®] . Hardness value is reported in gigapascal (GPa) and kgf/mm ² . The SRM [®] was individually measured and bears a serial number imprinted on the side of the epoxy mount.	Each
NIST-1909	Bright nickel - Hardness (Vickers) This Standard Reference Material [®] (SRM [®]) is intended primarily for use in calibrating Vickers-type microhardness testers and is certified for mean Vickers hardness values (HV) at a load of 9.81 N (1.000 kgf). NIST-1909 consists of a 1.35 cm square test block of electrodeposited bright nickel, approximately 750 µm thick, on an AISI 1010 steel substrate, mounted in a thermosetting epoxy. Five indentations were made on the polished surface of the SRM [®] . Hardness value is reported in gigapascal (GPa) and kgf/mm ² . The SRM [®] was individually measured and bears a serial number imprinted on the side of the epoxy mount.	Each
NIST-2798A	Bright nickel - Hardness (Vickers) This Standard Reference Material (SRM [®]) is intended primarily for use in calibrating Vickers-type microhardness testers and is certified for mean Vickers hardness values (HV) at a load of 4.905 N (0.500 kgf). NIST-2798a consists of a 1.35 cm square test block of electrodeposited bright nickel, approximately 750 µm thick, on an AISI 1010 steel substrate, mounted in a thermosetting epoxy. Five indentations were made on the polished surface of the SRM [®] . Hardness value is reported in gigapascal (GPa) and kgf/mm ² . The SRM [®] was individually measured and bears a serial number imprinted on the side of the epoxy mount.	Each
NIST-2830	Ceramic silicon nitride - Hardness (Knoop) Load 19.6N Certified value Hardness (nominal) 1500 kg/mm ²	Each

Particles and surface properties

Code	Product	Unit
NIST-2831	<p>Vickers Hardness of Ceramics and Hardmetals</p> <p>This Standard Reference Material (SRM[®]) is intended for use in the calibration of all hardness and microhardness testing machines whereby a Vickers indentation is made and then measured with a microscope. The SRM has five NIST-made indents in the middle of a polished face certified for the individual diagonal lengths, the average diagonal length, and the average hardness value for indentations made at a load of 9.8 N (1 kgf). A unit of NIST-2831 consists of a 25 mm D × 9.5 mm disc that has a nominal hardness of approximately 15.0 GPa (1530 kgf/mm²) packaged in a wooden box. Each unit is individually certified and bears a serial number scribed on the opposite (bottom) face of the disc. Vickers hardness is calculated as $HV = \alpha P/d^2$, where P is the indentation load, d is the average diagonal size $[(d_1 + d_2)/2]$, and α is the indenter constant, which, for an ideal Vickers indenter is 1.8544. If P is in units of Newton, and d is in units of meters, then HV will be in units of N/m² or Pa. A conversion factor of 1×10^{-9} may be used to convert HV to units of GPa. In this certificate, older traditional units of hardness expressed as kgf/mm² are also included in parenthesis for the convenience of users.</p>	Each

Surface roughness

NIST-2073a	<p>Electroless-nickel coated steel</p> <p>This Standard Reference Material[®] is certified for roughness average R_a and surface spatial wavelength, D, and is intended for use as a standard for the calibration of stylus instruments that are used to measure surface roughness.</p> <p>2.4 cm x 3.3 cm</p> <p>Certified values</p> <p>Roughness average R_a..... 3.0 μm Wavelength D 99.099 μm</p>	Each									
NIST-2074	<p>Electroless-nickel coated steel</p> <p>This Standard Reference Material[®] is certified for roughness average R_a and surface spatial wavelength, D, and is intended for use as a standard for the calibration of stylus instruments that are used to measure surface roughness.</p> <p>2.4 cm x 3.3 cm</p> <p>Certified values</p> <p>Roughness average R_a..... 1.0 μm Wavelength D 40 μm</p>	Each									
NIST-2075	<p>Electroless-nickel coated steel</p> <p>This Standard Reference Material[®] is certified for roughness average R_a and surface spatial wavelength, D, and is intended for use as a standard for the calibration of stylus instruments that are used to measure surface roughness.</p> <p>2.4 cm x 3.3 cm</p> <p>Certified values</p> <p>Roughness average R_a..... 1.0 μm Wavelength D 800 μm</p>	Each									
NIST-RM 8457	<p>Ultra high molecular weight polyethylene</p> <p>This Reference Material (RM), is intended for evaluations of cross-linking induced by radiation exposure, such as used to improve wear characteristics. Each unit of NIST-RM 8457 consists of 10 cubes of ultra high molecular weight polyethylene (UHMWPE) of nominal dimension 0.5 cm. The cubes are sized for measurement of cross-link density by swelling. The material as supplied has not been irradiated, however.</p> <p>Reference values</p> <table border="0"> <thead> <tr> <th>Cube dimension</th> <th>Dimension (cm)</th> <th>Surface roughness (μm)</th> </tr> </thead> <tbody> <tr> <td>Faces normal to bar direction</td> <td>0.4919 \pm 0.005</td> <td>5.5 \pm 0.6</td> </tr> <tr> <td>Faces perpendicular to bar direction</td> <td>0.5017 \pm 0.006</td> <td></td> </tr> </tbody> </table>	Cube dimension	Dimension (cm)	Surface roughness (μ m)	Faces normal to bar direction	0.4919 \pm 0.005	5.5 \pm 0.6	Faces perpendicular to bar direction	0.5017 \pm 0.006		10 cubes
Cube dimension	Dimension (cm)	Surface roughness (μ m)									
Faces normal to bar direction	0.4919 \pm 0.005	5.5 \pm 0.6									
Faces perpendicular to bar direction	0.5017 \pm 0.006										

Surface tension

<p>GUM 11.1 - GUM 11.3</p> <p>Reference materials certified by the Physical Chemistry Division of the Central Office of Measures (GUM), Warsaw. They are intended for the calibration and checking tensiometers. All standards are supplied with a certificate showing value of surface tension with an uncertainty 0.1 mN/m and value of density with an uncertainty of 0.1 kg/m³. Decimal values are given in the certificate.</p>		
GUM 11.1	<p>Isooctane</p> <p>Certified value</p> <p>Surface tension..... 18 mN/m at 20 °C</p>	30 mL
GUM 11.2	<p>Benzene</p> <p>Certified value</p> <p>Surface tension..... 28 mN/m at 20 °C</p>	30 mL
GUM 11.3	<p>Glycerol</p> <p>Certified value</p> <p>Surface tension..... 63 mN/m at 20 °C</p>	30 mL

Code Product Unit

Depth profiling

BCR-261T	Tantalum pentoxide on tantalum foil The material consists of two sets of 4 rectangular foils of 5 x 10 mm ² of both oxide thicknesses. The oxide layers are grown by anodic oxidation evenly on both sides of the foils. Certified values	2x4 foils
Areal density of oxygen atoms		
	Certified values [10 ²¹ m ⁻²]	Uncertainty [10 ²¹ m ⁻²]
Oxide thickness n		
30 nm material (nominal).....	1.72	0.07
100 nm material (nominal).....	5.40	0.12
	Certified ratio [dimensionless]	Uncertainty [dimensionless]
Oxide thickness ratio (n ₃₀ /n ₁₀₀)	0.321	0.013

NIST-2134	Arsenic in silicon - Depth profile This Standard Reference Material® (SRM®) is intended for use in calibrating secondary ion response to minor and trace levels of arsenic in a silicon matrix by the analytical technique of secondary ion mass spectrometry (SIMS). NIST-2134 is intended for calibrating the response of a SIMS instrument for arsenic in a silicon matrix under a specific set of instrumental conditions. It may also be used by a laboratory as a transfer standard for the calibration of working standards of arsenic in silicon. This SRM consists of a 1 cm x 1 cm single crystal silicon substrate that has been ion implanted with the isotope ⁷⁵ As at a nominal energy of 100 keV. NIST-2134 is certified for the retained dose of 75 As atoms. The dose is expressed in units of arsenic mass per unit area. Additional noncertified information about the concentration of arsenic atoms as a function of depth below the surface is provided by SIMS. The total retained dose of ⁷⁵ As atoms was determined by instrumental neutron activation analysis. Certified Retained Dose of ⁷⁵ As.....0.09120 µg/cm ² ± 0.00035 µg/cm ² Using a value of 74.9216 g/mol for the isotopic mass of ⁷⁵ As, the retained dose is equivalent to 7.330 × 10 ¹⁴ atoms/cm ² ± 0.028 × 10 ¹⁴ atoms/cm ²	Each
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NIST-2135C	Nickel-chromium thin film - Depth profile Intended for calibrating equipment used to measure sputtered depth and erosion rates in surface analysis. <u>Total thickness</u> Certified values Cr.....206.3 µg/cm ² Ni.....197.4 µg/cm ² <u>Single layer thickness</u> Certified values Cr.....41.3 µg/cm ² Ni.....49.4 µg/cm ²	Each
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NIST-2137	Boron implant in silicon - Depth profile Intended for calibrating the secondary ion response to minor and trace element levels in a silicon matrix. Certified value B-10 1.018 x 10 ¹⁵ atoms/cm ²	Each
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Length calibration and lateral resolution

BAM-L200	Nanoscale stripe pattern for length calibration and testing of lateral resolution Stripe pattern, dimensions: 10.8 mm x 4 mm x approx. 5 mm Please ask for further details	Each
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Thickness

BAM-L100	Titanium (Ti) Aluminium (Al) multilayer on 100Cr6 steel substrate - disc (30 mm x 5 mm) Total layer thickness.....individually certified for each CRM	disc
BAM-L101	Titanium dioxide (TiO2) Silicon dioxide (SiO2) multilayer on BK7 glass - plate (30 mm x 30 mm x 1 mm) Total layer thickness.....individually certified for each CRM	plate
BAM-L102	Titanium nitride (TiN) single layer - disc (30 mm x 5 mm) Layer thickness.....individually certified for each CRM	disc
BAM-L103	Vanadium nitride (VN) single layer - disc (30 mm x 5 mm) Layer thickness.....individually certified for each CRM	disc
BAM-L104	Titanium carbide (TiC) single layer- disc (30 mm x 5 mm) Layer thickness.....individually certified for each CRM	disc
BAM-L105	Vanadium carbide (VC) single layer- disc (30 mm x 5 mm) Layer thickness.....individually certified for each CRM	disc

Particles and surface properties

Code	Product	Unit
	NIST-1358B - NIST-1364B These NIST Standard Reference Materials® are suitable for calibrating instruments used in the measurement of organics and nonmagnetic inorganic coatings on steel. They consist of fine grained copper of varying thicknesses electrodeposited onto low carbon steel substrates having the properties of AISI 1010 steel. These uniform coatings are then overplated with a thin protective layer of chromium and the total coating thickness is then certified.	
NIST-1358b	Copper and chromium on steel - Coating thickness 45 mm × 45 mm coupons	set (4)
NIST-1359b	Copper and chromium on steel - Coating thickness 45 mm × 45 mm coupons	set (4)
NIST-1361b	Copper and chromium on steel - Coating thickness 45 mm × 45 mm coupons	set (4)
NIST-1362b	Copper and chromium on steel - Coating thickness 45 mm × 45 mm coupons	set (4)
NIST-1363b	Copper and chromium on steel - Coating thickness 45 mm × 45 mm coupons	set (4)
NIST-1364b	Copper and chromium on steel - Coating thickness 45 mm × 45 mm coupons	set (4)
NIST-2321	Tin-lead alloy on copper Intended for calibrating X-ray fluorescence equipment. Each unit, which consists of a plate of an electroplated tin-lead alloy coating on a copper substrate, is individually certified for composition and mass per unit area.	Each

Abrasive wear

NIST-1857	D-2 Tool steel 0.78 x 2.5 x 7.6 cm Certified for the ASTM G65 abrasion test	2 blocks
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Reference Nanomaterials

LGC Standards introduces reference nanomaterials range

LGC Standards has introduced the NM series reference nanomaterials to aid research and testing into the applications and impacts of nanotechnology.

One of the most comprehensive nanomaterial research programmes is being carried out by the Organisation for Economic Co-operation and Development's (OECD) Working Party on Manufactured Nanomaterials (WPMN). This programme focuses on the implications of the use of nanomaterials for human health and environment safety, focusing on testing and assessment methods. Master samples of the NM-series reference nanomaterials are stored in the nanomaterials repository of the European Commission's Joint Research Centre (JRC). The JRC distributes these master samples for use by EU Member States' authorities and in the OECD's Working Party on Manufactured Nanomaterials programme.

The NM nanomaterials available from LGC Standards encompass the OECD WPMN priority list of nanomaterials. These materials have been selected based on commercial importance and have been characterised using OECD recommended test methods and may serve as:

- Performance standard materials for testing and test method development
- Control materials for safety testing
- Testing materials for reference result and predictive toxicity testing

The materials have been produced from a selected homogenised master batch of raw material and sub-sampled under Good Laboratory Practice (GLP) conditions. The homogeneity and stability of all the samples follow the principles of ISO Guide 34 and are continuously monitored for stability under an isochronous monitoring study scheme.

Reference data

The NM nanomaterials are supplied with a Material Information Sheet. Available information includes material identification data such as CAS number, structural formula/molecular structure, composition (including degree of purity, known impurities or additives), basic morphology and surface chemistry.

Extensive data on the endpoints tested is being collated to provide further information on the material's Physical-Chemical Properties and Material Characterization, Environmental Fate and Mammalian Toxicology.

REACH applications:

The EU REACH regulations covering the Registration, Evaluation, Authorisation, and Restriction of Chemical Substances applies to nanomaterials.

As stated in the REACH guidance, registration dossiers should include "Available information from assessments carried out under other international and national programmes (...). Deviations from such assessments shall be justified". For nanomaterials an important source of assessments is those carried out by the Organisation for Economic Co-operation and Development's Working Party on Manufactured Nanomaterials, using these NM series products.

Code	Product	Unit
New NM-101	Titanium dioxide (anatase, uncoated) Particle characterisation methods Primary crystal size according to Scherrer 8 nm Primary crystal size according to XRD determination 6 nm Specific surface area according to BET 320 m ² /g	2000 mg
New NM-102	Titanium dioxide (anatase, uncoated) Particle characterisation methods Primary crystal size according to Scherrer 22 nm Primary crystal size according to XRD determination 20 nm Specific surface area according to BET 90 m ² /g	500 mg
New NM-103	Titanium dioxide (hydrophobic, rutile) Particle characterisation methods Primary crystal size according to Scherrer 20 nm Primary crystal size according to XRD determination 20 nm Specific surface area according to BET 60 m ² /g	2000 mg
New NM-104	Titanium dioxide (hydrophilic, rutile) Particle characterisation methods Primary crystal size according to Scherrer 20 nm Primary crystal size according to XRD determination 20 nm Specific surface area according to BET 60 m ² /g	500 mg
New NM-105	Titanium dioxide (rutile-anatase) Particle characterisation methods Primary crystal size according to Scherrer 21 nm Primary crystal size according to XRD determination 22 nm Specific surface area according to BET 61 m ² /g	250 mg

Reference Nanomaterials

	Code	Product	Unit
New	NM-110	Zinc oxide (uncoated) Particle characterisation methods Primary crystal size according to Horiba Light scattering 70-200 nm Primary crystal size according to XRD determination 41.5 nm Specific surface area according to BET 13 m ² /g	2000 mg
New	NM-111	Zinc oxide (coated triethoxycaprylylsilane) Particle characterisation methods Particle size < 200 nm (mean ca. 130 nm, range about 90 to 190 nm analyzed by Horiba Light Scattering) Primary crystal size according to XRD determination 33.8 nm Specific surface area according to BET 16 m ² /g	2000 mg
New	NM-200	Synthetic amorphous silica (PR-A-02) Particle characterisation methods Primary particles in the 10-25 nm range, particles aggregated Primary crystal size by TEM 20 nm Specific surface area according to BET 230 m ² /g	500 mg
New	NM-201	Synthetic amorphous silica (PR-B-01) Particle characterisation methods Primary particles in the 10-25 nm range, particles aggregated Primary crystal size by TEM 20 nm	500 mg
New	NM-202	Synthetic amorphous silica (PY-AB-03) Particle characterisation methods Primary particles in the 10-25 nm range, particles aggregated Primary crystal size by TEM 20 nm	500 mg
New	NM-203	Synthetic amorphous silica (PY-A-04) Particle characterisation methods Primary particles in the 5-30 nm range, particles aggregated Primary crystal size by TEM 20 nm Specific surface area according to BET 226 m ² /g	500 mg
New	NM-204	Synthetic amorphous silica (PR-A-05) Particle characterisation methods Primary particles in the 10-25 nm range, particles aggregated Primary crystal size by TEM 20 nm Specific surface area according to BET 144 m ² /g	2000 mg
New	NM-211	Cerium (IV) oxide (precipitated, uncoated, cubic) Particle characterisation methods Primary crystal size according to Scherrer 10.3 nm Specific surface area according to BET 66 m ² /g	500 mg
New	NM-212	Cerium (IV) oxide (precipitated, uncoated, cubic) Particle characterisation methods Primary crystal size according to Scherrer 33 nm Specific surface area according to BET 28 m ² /g	500 mg
New	NM-300K	Silver (< 20 nm) Particle characterisation methods Solid Contents: 10.16 weight % Particle size: 15 nm; D90 <20nm (90% < 20nm)	2000 mg
New	NM-300KDIS	Ag - dispersant The material corresponds to the matrix/media/vehicle of NM 300K including all components, but without silver and serves as control material.	1000 mg
New	NM-302	Silver rods Particle characterisation methods Solid contents: 8.3 weight % Particles size 50nm diameter, elongated, rods	2000 mg
New	NM-400	Multi-walled carbon nanotubes Particle characterisation methods Average diameter: 9.5 nm Average length: 1.5 µm Specific surface area according to BET 280 m ² /g	250 mg
New	NM-401	Multi-walled carbon nanotubes Particle characterisation methods Average diameter 10-30 nm Length 5-15 µm Specific surface area according to BET 300 m ² /g	150 mg

Code	Product	Unit
New NM-402	Multi-walled carbon nanotubes Particle characterisation methods Average diameter: 5-15 nm Length: 0.1 - 10 µm Specific surface area according to BET 50-300 m ² /g	250 mg

Optical properties

Molecular absorption and luminescence

Code	Product	Unit																									
ERM-FB012	IR wavelength standard - Polystyrene in hexane This certified reference material is intended for use in the verification and calibration of infra-red spectrometers, within the range of spectral bandwidths quoted Certified values IR wavelength positions of four peaks (3026.0, 1601.1, 1028.8 and 698.0 cm ⁻¹).	5 x 1 mL																									
ERM-FB020	UV-Visible wavelength standard for HPLC detectors - Holmium/neodymium oxides solution The certified reference material is intended for use in the verification and calibration of the wavelength scale of ultra-violet/visible HPLC detectors. Certified values UV/visible wavelength location of 7 peaks in the spectral range 241 to 797 nm at four spectral bandwidths (1, 4, 7 and 10 nm).	2 x 3 mL																									
ERM-FB021	UV-Visible absorbance standard for HPLC detectors - Sodium nitrate/cobalt chloride/nickel chloride solution This certified reference material is intended for checking the linearity of the absorbance scales of UV/Visible HPLC detectors Certified values 7 standard + 1 blank UV/visible absorbance for four wavelengths (299, 395, 512 and 719 nm) at 4 bandwidths (1, 4, 7, and 10 nm).	8 x 3 mL																									
NIST-931f	Liquid filters UV-visible absorbance at 4 wavelengths (302, 395, 512 and 678 nm). Liquid Filter	set (12)																									
	<table border="1"> <thead> <tr> <th></th> <th colspan="4">Nominal Wavelength (nm)</th> </tr> <tr> <th></th> <th>302</th> <th>395</th> <th>512</th> <th>678</th> </tr> </thead> <tbody> <tr> <td>Level I</td> <td>0.2925 ± 0.0016</td> <td>0.3108 ± 0.0017</td> <td>0.3011 ± 0.0017</td> <td>0.1169 ± 0.0012</td> </tr> <tr> <td>Level II</td> <td>0.5969 ± 0.0028</td> <td>0.6223 ± 0.0029</td> <td>0.5917 ± 0.0029</td> <td>0.2344 ± 0.0018</td> </tr> <tr> <td>Level III</td> <td>0.9668 ± 0.0043</td> <td>0.9328 ± 0.0042</td> <td>0.8969 ± 0.0042</td> <td>0.3517 ± 0.0024</td> </tr> </tbody> </table>		Nominal Wavelength (nm)					302	395	512	678	Level I	0.2925 ± 0.0016	0.3108 ± 0.0017	0.3011 ± 0.0017	0.1169 ± 0.0012	Level II	0.5969 ± 0.0028	0.6223 ± 0.0029	0.5917 ± 0.0029	0.2344 ± 0.0018	Level III	0.9668 ± 0.0043	0.9328 ± 0.0042	0.8969 ± 0.0042	0.3517 ± 0.0024	
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NIST-935a	Potassium dichromate - UV UV absorbance at 5 wavelengths (235, 257, 313, 345, and 350 nm).	15 g																									
New NIST-1935A	Potassium dichromate solution/UV absorbance standard This Standard Reference Material [®] (SRM [®]) is intended for use as a reference standard for verifying the accuracy of the absorbance scale of absorption spectrometers that can provide an effective bandpass of 2 nm or less at 235 nm, 257 nm, 313 nm, and 350 nm. A unit of NIST-1935a contains five blank solutions and five sample solutions, for a total of ten ampoules. The nominal absorbances referred to the blank, span a range of 0.3 to 0.9 absorbance units over the four certified wavelengths for a 10 mm pathlength cuvette. Approximately 10 mL of each solution is flame-sealed into an individual glass ampoule, which has been pre-scored for easy opening. The blank and sample solutions are packaged in separate trays. Certified net apparent absorbance for NIST-1935a at 22 °C ± 2 °C and for a 10.00 mm pathlength Certified Value of Apparent Absorbance at Indicated Wavelength 235 nm..... 0.7455 ± 0.0040 313 nm0.2905 ± 0.0032 257 nm..... 0.8680 ± 0.0050 350 nm0.6456 ± 0.0034	set (10)																									
GUM 9D.1	Estrofol film film - Wavenumber standard for infrared range This reference material from the Central Office of Measures (Poland) is intended for use in the calibration of the wave number scale of spectrophotometers in the infrared (IR) spectral region from 400 cm ⁻¹ to 4000 cm ⁻¹ (21 peaks). GUM 9.D1 consists of two cards made of transparent poly(ethylene terephthalate) film 6 mm and 50 mm thick, in holders.	set (2)																									
NIST-1921b	Polystyrene film - IR transmission wavelength This Standard Reference Material [®] (SRM [®]) is intended primarily for use in calibrating the wavelength (wavenumber) scale of spectrophotometers in the infrared (IR) spectral region from 3.2 µm to 18.5 µm (540 cm ⁻¹ to 3125 cm ⁻¹). SRM 1921b is a matt finish polystyrene film approximately 38 µm thick with a 25 mm diameter exposed area, centered 38 mm from the bottom of a cardboard holder, which is 5 cm × 11 cm × 0.2 cm in size.	card																									
NIST-2940	Relative intensity correction standard for fluorescence spectroscopy (Orange emission) 412 nm This Standard Reference Material [®] (SRM [®]) is intended for use for the evaluation and calibration of the relative spectral responsivity of steady-state fluorescence spectrometers with a continuous excitation source and for determining the day-to-day or instrument-to-instrument intensity variations of a single or similar fluorescence instrument(s), respectively. This SRM [®] is certified for the relative, corrected emission spectrum, E, in relative power units from emission wavelengths λ _{EM} = 500 nm to 800 nm at 1 nm wavelength intervals at a fixed excitation wavelength (λ _{EX}) of 412 nm.	contain.																									

Optical properties

Code	Product	Unit
NIST-2941	Relative intensity correction standard for fluorescence spectroscopy (Green emission) 427 nm This Standard Reference Material® (SRM®) is intended for use for the evaluation and calibration of the relative spectral responsivity of steady-state fluorescence spectrometers with a continuous excitation source and for determining the day-to-day or instrument-to-instrument intensity variations of a single or similar fluorescence instrument(s), respectively. This SRM® is certified for the relative, corrected emission spectrum, E, in relative power units from emission wavelengths $\lambda_{EM} = 450 \text{ nm}$ to 650 nm at 1 nm wavelength intervals at a fixed excitation wavelength (λ_{EX}) of 427 nm .	cuv. (1)
New NIST-2942	Relative intensity correction standard for fluorescence spectroscopy (Ultraviolet emission) 310 nm This Standard Reference Material (SRM) is intended for use in the evaluation and calibration of the relative spectralresponsivity of steady-state fluorescence spectrometers with a continuous excitation source and for determining the day-to-day or instrument-to-instrument intensity variations of a single or similar fluorescence instrument(s), respectively. A unit of NIST-2942 consists of a single cuvette-shaped piece of solid glass. This SRM is certified for the relative, corrected emission spectrum, E, in relative energy unitsfrom emission wavelengths $\lambda_{EM} = 320 \text{ nm}$ to 430 nm at 1 nm wavelength intervals at a fixed excitation wavelength (λ_{EX}) of 310.1 nm .	Each
New NIST-2943	Relative intensity correction standard for fluorescence spectroscopy (Blue emission) This Standard Reference Material® (SRM®) is intended for use in the evaluation and calibration of the relative spectral responsivity of steady-state fluorescence spectrometers with a continuous excitation source and for determining the day-to-day or instrument-to-instrument intensity variations of a single or similar fluorescence instrument(s), respectively. NIST-2943 is a copper-doped (mole fraction of 0.01% Cu_2O) phosphate-matrix glass. A unit of NIST-2943 consists of a single cuvette-shaped piece of solid glass. Each piece is a rectangular solid block with standard cuvette dimensions $12.5 \text{ mm} \times 12.5 \text{ mm} \times 45.0 \text{ mm}$, with three of the four long faces optically polished and one long face, the top face and the bottom face ground to a frosted finish using a 400 grit polish. The serial number of each unit is etched on the top face. There are 17 units of NIST-2943 Sample Series with serial numbers Cu0xx through yy. This SRM is certified for the relative, corrected emission spectrum, E, in relative energy units from emission wavelengths $\lambda_{EM} = 350 \text{ nm}$ to 640 nm at 1 nm wavelength intervals at a fixed excitation wavelength (λ_{EX}) of 330.3 nm . Due to larger signal-to-noise levels near the peak maximum, the emission range from $\lambda_{EM} = 380 \text{ nm}$ to 560 nm is recommended as optimal for most instruments and applications. Note that this standard's certified values become reference values when used for spectral correction of fluorescence spectrometers with pulsed light sources.	Each
NIST-2036	Near infrared wavelength/reflection standard This Standard Reference Material (SRM®) is a certified transfer standard intended for the verification and calibration of the wavelength/wavenumber scale of Near-Infrared (NIR) spectrometers operating in diffuse reflectance mode. NIST-2036 is a glass physically contacted with a piece of sintered polytetrafluoroethylene (PTFE). The combination of the rare earth oxide glass with a nearly ideal diffuse reflector provides reflection-absorption bands that range from approximately 15% R to 40% R. NIST-2036 is certified for the 10% band fraction centroid of seven bands spanning the spectral region from 975 nm to 1946 nm (air wavelength). In addition, it is certified for the 10% band fraction centroid location of the same seven bands in the spectral region from 10300 cm^{-1} to 5130 cm^{-1} at 8 cm^{-1} resolution (vacuum wavenumber).	Each
NIST-2065	Ultraviolet-visible-near-infrared transmission wavelength/vacuum wavenumber standard This Standard Reference Material (SRM®) is a certified standard intended for the verification and calibration of the wavelength/wavenumber scale of ultraviolet (UV)-Visible-Near-Infrared (NIR) spectrometers operating in transmission mode. NIST-2065 is certified for the location of seven absorbance bands (COG) in the spectral region from 10300 cm^{-1} to 5130 cm^{-1} at 4 cm^{-1} resolution. NIST-2065 is a glass consisting of a combination of rare earth oxides. The optical filter is 25 mm in diameter and 1.5 mm thick. Please ask for more details.	Each
NIST-2517a	High resolution wavelength calibration reference Intended for wavelength calibration in the spectral region of 1510 nm to 1540 nm . NIST-2517a is a single-mode optical-fibre-coupled absorption cell containing acetylene ($^{12}\text{C}_2\text{H}_2$) gas at a pressure of 6.7 kPa (50 Torr). The absorption path length is 5 cm and the absorption lines are about 7 pm wide.	cell
NIST-2241	Relative Intensity Correction Standard for Raman Spectroscopy Using 785 nm Excitation NIST-2241 is a chromium-doped ($0.02 \text{ mol } \%$ Cr_2O_3) sodium borosilicate matrix glass. One unit of this Standard Reference Material® consists of a glass slide that is approximately 10.7 mm in width \times 30.4 mm in length \times 2.0 mm in thickness, with one surface optically polished and the opposite surface ground to a frosted finish using a 400 grit polish. This Standard Reference Material® (SRM®) is a certified spectroscopic standard for the correction of the relative intensity of Raman spectra obtained with instruments employing 785 nm laser excitation. NIST-2241 consists of an optical glass that emits a broadband luminescence spectrum when excited with 785 nm laser radiation. The relative spectral intensity of the glass luminescence has been determined through the use of a white-light, uniform-source, integrating sphere that has been calibrated for its irradiance at NIST. The shape of the luminescence spectrum of this glass is described by a polynomial expression that relates the relative spectral intensity to the wavenumber (cm^{-1}) expressed as the Raman shift from the excitation wavelength of 785 nm . This polynomial, together with a measurement of the luminescence spectrum of the standard, can be used to determine the spectral intensity-response correction that is unique to each Raman system. The resulting instrument-intensity-response correction may then be used to obtain Raman spectra that are instrument independent. This SRM® is intended for use in measurements over the range of $20 \text{ }^\circ\text{C}$ to $25 \text{ }^\circ\text{C}$ and with Raman systems that employ laser excitation at 785 nm . It may also be used for Raman excitation with lasers that range from 784 nm to 786 nm in excitation wavelength.	Each

Code	Product	Unit
NIST-2242	<p>Relative Intensity Correction Standard for Raman Spectroscopy</p> <p>NIST-2242 is a certified spectroscopic standard for the correction of the relative intensity of Raman spectra obtained with instruments employing 532 nm laser excitation. It consists of an optical glass that emits a broadband luminescence spectrum when excited with 532 nm laser radiation. The relative spectral intensity of the glass luminescence has been determined through the use of a white-light, uniform-source, integrating sphere that has been calibrated for its irradiance at NIST. The shape of the luminescence spectrum of this glass is described by a polynomial expression that relates the relative spectral intensity to the wavenumber (cm^{-1}) expressed as the Raman shift from the excitation wavelength of 532 nm. This polynomial, together with a measurement of the luminescence spectrum of the standard, can be used to determine the spectral intensity-response correction that is unique to each Raman system. The resulting instrument-intensity-response correction may then be used to obtain Raman spectra that are instrument independent. This Standard Reference Material (SRM[®]) is intended for use in measurements over the range of 20 °C to 25 °C.</p>	Each
NIST-2243	<p>Relative Intensity Correction Standard for Raman Spectroscopy</p> <p>This Standard Reference Material (SRM[®]) is a certified spectroscopic standard for the correction of the relative intensity of Raman spectra obtained with instruments employing either 488 nm or 514.5 nm laser excitation. NIST-2243 consists of an optical glass that emits a broadband luminescence spectrum when excited with either of these two laser wavelengths. The relative spectral intensity of the glass luminescence, for each excitation wavelength, has been determined through the use of a white-light, uniform-source, integrating sphere that has been calibrated for its irradiance at NIST. The shape of the luminescence spectrum of this glass is described by a polynomial expression that relates the relative spectral intensity to the wavenumber (cm^{-1}) expressed as the Raman shift from the excitation laser wavelength. This polynomial, together with a measurement of the luminescence spectrum of the standard, can be used to determine the spectral intensity-response correction that is unique to each Raman system. The resulting instrument-intensity-response correction may then be used to obtain Raman spectra that are instrument independent.</p>	Each
New NIST-2244	<p>Relative Intensity Correction Standard for Raman Spectroscopy Using 1064 nm Excitation</p> <p>NIST-2244 is a certified spectroscopic standard for the correction of the relative intensity of Raman spectra obtained with instruments employing 785 nm laser excitation. NIST-2244 consists of an optical glass that emits a broadband luminescence spectrum when excited with 785 nm laser radiation. The relative spectral intensity of the glass luminescence has been determined through the use of a white-light, uniform-source, integrating sphere that has been calibrated for its irradiance at NIST. The shape of the luminescence spectrum of this glass is described by a polynomial expression that relates the relative spectral intensity to the wavenumber (cm^{-1}) expressed as the Raman shift from the excitation wavelength of 785 nm. This polynomial, together with a measurement of the luminescence spectrum of the standard, can be used to determine the spectral intensity-response correction that is unique to each Raman system. The resulting instrument-intensity-response correction may then be used to obtain Raman spectra that are instrument independent.</p>	Each

Starna optical reference materials

Starna[®] optical reference materials produced by Starna Scientific are available from LGC Standards. Starna Scientific was one of the first reference material producers in the UK to receive accreditation to ISO guide 34. The company has over 30 years experience in the development and production of liquid-filled, heat sealed quartz cells with good long term stability and the optical properties needed to evaluate performance of UV-visible spectrophotometers. The range also includes robust solid glass filter materials for both absorbance and wavelength measurements. These certified reference materials (CRM) for the validation of wavelength accuracy, absorbance accuracy, stray light and resolution in the UV and visible regions, can be used in analytical, clinical and research laboratories. All of the Starna[®] CRMs are traceable to NIST primary standards. Brief descriptions of the types of products available are given below with more detailed product descriptions in the pages that follow.

Absorbance / transmission

Potassium dichromate - UV absorbance and linearity

The use of potassium dichromate solvated in perchloric acid is an established and recognised method for the validation of the absorbance scale of UV and visible spectrophotometers. Starna[®] provides sets of certified sealed cells covering absorbance values from 0.2 to 3.0 over the wavelength range from 235nm to 350nm. For the far UV, nicotinic acid is the recognised standard and covers from 210nm to 270nm.

STRM-0204060810	<p>Potassium dichromate - UV absorbance and linearity</p> <p>Set of 6 cells Each set consists of one blank (0.001M perchloric acid) and five concentrations, with nominal values of 20 mg/L, 40 mg/L, 60 mg/L, 80 mg/L, and 100 mg/L.</p>	set
STRM-0204060810-R	Recertification: Potassium dichromate - UV absorbance and linearity	set
STRM-02040608	<p>Potassium dichromate - UV absorbance and linearity</p> <p>Set of 5 sets Each set consists of one blank (0.001M perchloric acid) and four concentrations, with nominal values of 20 mg/L, 40 mg/L, 60 mg/L and 80 mg/L.</p>	set
STRM-02040608-R	Recertification: Potassium dichromate - UV absorbance and linearity	set
STRM-020406	<p>Potassium dichromate - UV absorbance and linearity</p> <p>Set of 4 cells Each set consists of one blank (0.001M perchloric acid) and three concentrations, with nominal values of 20 mg/L, 40 mg/L and 60 mg/L.</p>	set
STRM-020406-R	Recertification: Potassium dichromate - UV absorbance and linearity	set

Optical properties

Code	Product	Unit
STRM-0204	Potassium dichromate - UV absorbance and linearity Set of 3 cells Each set consists of one blank (0.001M perchloric acid) and two concentrations, with nominal values of 20 mg/L and 40 mg/L.	set
STRM-0204-R	Recertification: Potassium dichromate - UV absorbance and linearity	set
STRM-02	Potassium dichromate - UV absorbance and linearity Set of 2 cells Each set consists of one blank (0.001M perchloric acid) and a solution with a nominal value of 20 mg/L.	set
STRM-02-R	Recertification: Potassium dichromate - UV absorbance and linearity	set
STRM-04	Potassium dichromate - UV absorbance and linearity Set of 2 cells Each set consists of one blank (0.001M perchloric acid) and a solution with a nominal value of 40 mg/L.	set
STRM-04-R	Recertification: Potassium dichromate - UV absorbance and linearity	set
STRM-06	Potassium dichromate - UV absorbance and linearity Set of 2 cells Each set consists of one blank (0.001M perchloric acid) and a solution with a nominal value of 60 mg/L.	set
STRM-06-R	Recertification: Potassium dichromate - UV absorbance and linearity	set
STRM-08	Potassium dichromate - UV absorbance and linearity Set of 2 cells Each set consists of one blank (0.001M perchloric acid) and a solution with a nominal value of 80 mg/L.	set
STRM-08-R	Recertification: Potassium dichromate - UV absorbance and linearity	set
STRM-10	Potassium dichromate - UV absorbance and linearity Set of 2 cells Each set consists of one blank (0.001M perchloric acid) and a solution with a nominal value of 100 mg/L.	set
STRM-10-R	Recertification: Potassium dichromate - UV absorbance and linearity	set
STRM-60	Potassium dichromate - UV absorbance and linearity Set of 2 cells Each set consists of one blank (0.001M perchloric acid) and a solution with a nominal value of 600 mg/L.	set
STRM-60-R	Recertification: Potassium dichromate - UV absorbance and linearity	set

Neutral density filter - Visible absorbance and linearity

Schott NG-type glasses are used for the validation of the absorbance scale and linearity of spectrophotometers in the visible region. Starna[®] neutral density filters are available in sets covering nominal transmission values from 0.1% to 90%.

STRM-D1D39N	Neutral density filter - Visible absorbance and linearity Set of 3 glass filters and a blank holder Consists of one blank holder and three filters with nominal values of 0.1 %T, 0.3 %T, and 90 %T.	set
STRM-D1D39N-R	Recertification: Neutral density filter - Visible absorbance and linearity	set
STRM-1N2N3N	Neutral density filter - Visible absorbance and linearity Set of 3 glass filters and a blank holder Consists of one blank holder and three filters with nominal values of 10 %T, 20 %T, and 30 %T.	set
STRM-1N2N3N-R	Recertification: Neutral density filter - Visible absorbance and linearity	set
STRM-N1N35N	Neutral density filter - Visible absorbance and linearity Set of 3 glass filters and a blank holder Consists of one blank holder and three filters with nominal values of 1 %T, 3 %T, and 50 %T.	set
STRM-N1N35N-R	Recertification: Neutral density filter - Visible absorbance and linearity	set
STRM-5N	Neutral density filter - Visible absorbance and linearity Set of 1 glass filter and a blank holder Consists of one blank holder and one filter with a nominal value 50 %T.	set
STRM-5N-R	Recertification: Neutral density filter - Visible absorbance and linearity	set

Far UV Absorbance/transmission

STRM-1A2A3A4A	Nicotinic acid - UV absorbance and linearity Set of 5 cells Each set consists of one blank (0.1M hydrochloric acid) and four increasing concentrations, with nominal values of 6 mg/L, 12 mg/L, 18 mg/L and 24 mg/L.	set
STRM-1A2A3A4A-R	Recertification: Nicotinic acid - UV absorbance and linearity	set

Code	Product	Unit
Wavelength		
	Starna® sealed liquid references are available covering all wavelengths from the far UV to the visible. For the UV and visible, rare earth oxides like holmium oxide, didymium (a mixture of neodymium and praseodymium) and samarium solvated in perchloric acid are well recognised as suitable wavelength references.	
STRM-HL	<p>Holmium oxide - UV and visible wavelength</p> <p>Description: Holmium oxide (4% m/v) in 10% v/v perchloric acid. Primary usage: Assessment of wavelength scale accuracy in both UV and visible regions. Useable range: 240 nm to 650 nm, instruments with spectral bandwidth of less than 3 nm. Physical configuration: Far UV quartz cells that have been permanently heat sealed.</p> <p>Consists of one sealed cell, with certified peak at spectral bandwidth values of 0.10 nm, 0.25 nm, 0.50 nm, 1.00 nm, 1.50 nm, 2.00 nm and 3.00 nm.</p>	cell
STRM-HL-R	Recertification: Holmium oxide - UV and visible wavelength	cell
STRM-DL	<p>Didymium (neodymium & praseodymium) - UV and visible wavelength</p> <p>Description: Didymium (neodymium praseodymium) in perchloric acid. Primary usage: Assessment of wavelength scale accuracy in both UV and visible regions. Useable range: 290 nm to 870 nm, instruments with spectral bandwidth of less than 5 nm. Physical configuration: Far UV quartz cells that have been permanently heat sealed.</p> <p>Consists of one sealed cell, with certified peak at spectral bandwidth values of 0.10 nm, 0.25 nm, 0.50 nm, 1.00 nm, 1.50 nm, 2.00 nm and 3.00 nm.</p>	cell
STRM-DL-R	Recertification: Didymium (neodymium & praseodymium) - UV and visible wavelength	cell
STRM-SL	<p>Samarium - UV and visible wavelength</p> <p>Description: Samarium (III) oxide in perchloric acid. Primary usage: Assessment of wavelength scale accuracy in both UV and visible regions. Useable range: 230 nm to 560 nm, instruments with spectral bandwidth of less than 5 nm. Physical configuration: Far UV quartz cells that have been permanently heat sealed.</p> <p>Consists of one sealed cell, with certified peak at spectral bandwidth values of 0.10 nm, 0.25 nm, 0.50 nm, 1.00 nm, 1.50 nm, 2.00 nm and 3.00 nm.</p>	cell
STRM-SL-R	Recertification: Samarium - UV and visible wavelength	cell
STRM-HG	<p>Holmium glass filter - UV and visible wavelength</p> <p>Description: Holmium glass filter. Primary usage: Assessment of wavelength scale accuracy in the UV and visible regions. Useable range: 270 nm to 640 nm, instruments with spectral bandwidth of less than 10 nm. Physical configuration: Glass filters 'stress free' mounted in anodised aluminium holder.</p> <p>Consists of one filter, 'stress free' mounted in a proprietary NIST design, with certified peak at spectral bandwidth values of 0.10 nm, 0.25 nm, 0.50 nm, 1.00 nm, 1.50 nm, 2.00 nm, and 3.00 nm.</p>	filter
STRM-HG-R	Recertification: Holmium glass filter - UV and visible wavelength	filter
STRM-DG	<p>Didymium glass - UV wavelength</p> <p>Description: Didymium glass filter. Primary usage: Assessment of wavelength scale accuracy in the visible/near infrared region. Useable range: 430 nm to 890 nm, instruments with spectral bandwidth of less than 10 nm. Physical configuration: Glass filters 'stress free' mounted in anodised aluminium holder.</p> <p>Consists of one filter, "stress free" mounted in a proprietary NIST design, with certified peak at spectral bandwidth values of 0.10 nm, 0.25 nm, 0.50 nm, 1.00 nm, 1.50 nm, 2.00 nm, and 3.00 nm.</p>	filter
STRM-DG-R	Recertification: Didymium glass - UV wavelength	filter
Far UV wavelength		
STRM-RE	<p>Rare earth - UV and visible wavelength</p> <p>Description: Rare earth oxide in dilute sulphuric acid. Primary Usage: Assessment of wavelength scale accuracy in the UV region. Useable range: 200nm to 300nm, instruments with spectral bandwidth of less than 5nm. Physical Configuration: Far UV quartz cells that have been permanently heat sealed.</p> <p>Consists of one sealed cell, with certified peak at spectral bandpass values of 0.1 nm, 0.2 nm, 0.5 nm, 1.0 nm, 1.5 nm, 2.0 nm and 3.0 nm.</p>	cell
STRM-RE-R	Recertification: Rare earth - UV and visible wavelength	cell

Optical properties

Code	Product	Unit
Stray light		
Inorganic cut-off filters – UV stray light		
<p>This is a subtle source of error in UV and visible spectrophotometry. A variety of materials is available for measuring this parameter at several different wavelengths in the form of inorganic cut-off filters. They are designed with sharp cut-offs in transmissions at specified wavelengths which will enable any stray light to be measured.</p> <p>Description: Materials with sharp cut-offs in transmission at specified wavelengths.</p> <p>Primary usage: Detection of stray light in the UV region.</p> <p>Useable range: 200 nm to 260 nm, depending on the material.</p> <p>Physical configuration: Far UV quartz cells that have been permanently heat sealed.</p>		
STRM-AC	Inorganic cut-off filter (acetone) - UV stray light (cut-off at 326 nm)	set
STRM-AC-R	Recertification: Inorganic cut-off filter - UV stray light (cut-off at 326 nm)	set
STRM-KI	Inorganic cut-off filter (potassium iodide; 1% aqueous) - UV stray light (cut-off at 260 nm)	set
STRM-KI-R	Recertification: Inorganic cut-off filter - UV stray light (cut-off at 260 nm)	set
STRM-LC	Inorganic cut-off filter (lithium carbonate; saturated aqueous) - UV stray light (cut-off at 227 nm)	set
STRM-LC-R	Recertification: Inorganic cut-off filter - UV stray light (cut-off at 227 nm)	set
STRM-KC	Inorganic cut-off filter (potassium chloride; 1.2% aqueous) - UV stray light (cut-off at 200 nm)	set
STRM-KC-R	Recertification: Inorganic cut-off filter - UV stray light (cut-off at 200 nm)	set
STRM-SC	Inorganic cut-off filter (sodium chloride; 1% aqueous) - UV stray light (cut-off at 205 nm)	set
STRM-SC-R	Recertification: Inorganic cut-off filter - UV stray light (cut-off at 205 nm)	set
STRM-SI	Inorganic cut-off filter (sodium iodide; 1% aqueous) - UV stray light (cut-off at 260 nm)	set
STRM-SI-R	Recertification: Inorganic cut-off filter - UV stray light (cut-off at 260 nm)	set
STRM-SN	Inorganic cut-off filter (sodium nitrite; 5% aqueous) - UV stray light (cut-off at 390 nm)	set
STRM-SN-R	Recertification: Inorganic cut-off filter - UV stray light (cut-off at 390 nm)	set
STRM-AQ	Inorganic cut-off filter (water) - UV stray light (blank)	cell

Resolution

<p>Accurate absorbance and wavelength measurements can only be achieved if due consideration is given to the resolution of the monochromator in use. In modern instruments with grating monochromators, the resolution relates directly to the slit chosen. The smaller the slit and its associated spectral bandwidth, the greater the resolution. Simple checks on the resolution power of a spectrophotometer with Starna[®] resolution CRMs such as benzene vapour or toluene in hexane will provide useful references. Benzene vapour is used to validate the resolution of instruments with bandpass less than 1nm. Even this material can be supplied heat sealed into a quartz cell. An alternative liquid reference, toluene in hexane, helps users to meet the recommendations of the current European Pharmacopoeia.</p>														
STRM-TX	<p>Toluene in hexane - resolution</p> <p>Description: 0.020% v/v solution of toluene in hexane.</p> <p>Primary usage: Determination of spectral bandwidth in the UV region.</p> <p>Useable range: 265 nm to 270 nm, instruments with a spectral bandwidth of less than 3 nm.</p> <p>Physical configuration: Far UV quartz cells that have been permanently sealed.</p> <p>This formulation is described and used in the European Pharmacopoeia where the ratio of the peak maximum at 269 nm to the minimum at 266 nm gives a measure of the resolution of the instrument.</p> <p>Ratio table:</p> <table border="1"> <tr> <td>SBW (nm):</td> <td>0.5</td> <td>1.0</td> <td>1.5</td> <td>2.0</td> <td>3.0</td> </tr> <tr> <td>Ratio:</td> <td>2.5</td> <td>2.1</td> <td>1.6</td> <td>1.4</td> <td>1.0</td> </tr> </table>	SBW (nm):	0.5	1.0	1.5	2.0	3.0	Ratio:	2.5	2.1	1.6	1.4	1.0	set
SBW (nm):	0.5	1.0	1.5	2.0	3.0									
Ratio:	2.5	2.1	1.6	1.4	1.0									
STRM-TX-R	Recertification: Toluene in hexane - resolution	set												
STRM-BZ	<p>Benzene vapour</p> <p>Description: 0.1 mL benzene in the vapour state.</p> <p>Primary usage: Determination of spectral bandwidth in the UV region.</p> <p>Useable range: 230 nm to 270 nm, instruments with a spectral bandwidth of less than 1 nm.</p> <p>Physical configuration: Far UV quartz cells that have been permanently heat sealed.</p> <p>At spectral bandwidths less than 1 nm, the benzene vapour spectrum provides a useful reference that has characteristic features that may or may not be displayed – dependent upon the current spectrophotometer spectral bandwidth. Benzene vapour will not work well with a photodiode array spectrophotometer as this instrument type does not measure a continuum and the peaks will not be resolved well enough to be useable.</p>	cell												
STRM-BZ-R	Recertification: Benzene vapour	cell												

Code	Product	Unit
Sets		
The certified reference material sets have been assembled to make your verification task easier, and meet specific regulatory requirements.		
In addition, set prices do offer price savings over the purchase of individual certified reference materials.		
STRM-06HL	STRM-06 + STRM-HL	set
	STRM-06 Potassium dichromate - UV absorbance and linearity Set of 2 cells: Each set consists of one blank (0.001M perchloric acid) and a solution with a nominal value of 60 mg/L.	
	STRM-HL Holmium oxide - UV and visible wavelength (Holmium oxide (4% m/v) in 10% v/v perchloric acid) Consists of one sealed cell, with certified peak at spectral bandwidth values of 0.10 nm, 0.25 nm, 0.50 nm, 1.00 nm, 1.50 nm, 2.00 nm and 3.00 nm.	
STRM-06HL-R	Recertification: STRM-06 + STRM-HL	set
STRM-06DLKI	STRM-06 + STRM-DL + STRM-KI	set
	STRM-06 Potassium dichromate - UV absorbance and linearity Set of 2 cells: Each set consists of one blank (0.001M perchloric acid) and a solution with a nominal value of 60 mg/L.	
	STRM-DL Didymium (neodymium & praeosodymium) - UV and visible wavelength Didymium (neodymium praeosodymium) in perchloric acid Consists of one sealed cell, with certified peak at spectral bandwidth values of 0.10 nm, 0.25 nm, 0.50 nm, 1.00 nm, 1.50 nm, 2.00 nm and 3.00 nm.	
	STRM-KI Inorganic cut-off filter (potassium iodide; 1% aqueous) - UV stray light (cut-off at 260 nm)	
STRM-06DLKI-R	Recertification: STRM-06 + STRM-DL + STRM-KI	set
STRM-06HLKI	STRM-06 + STRM-HL + STRM-KI	set
	STRM-06 Potassium dichromate - UV absorbance and linearity Set of 2 cells: Each set consists of one blank (0.001M perchloric acid) and a solution with a nominal value of 60 mg/L.	
	STRM-HL Holmium oxide - UV and visible wavelength (Holmium oxide (4% m/v) in 10% v/v perchloric acid) Consists of one sealed cell, with certified peak at spectral bandwidth values of 0.10 nm, 0.25 nm, 0.50 nm, 1.00 nm, 1.50 nm, 2.00 nm and 3.00 nm.	
	STRM-KI Inorganic cut-off filter (potassium iodide; 1% aqueous) - UV stray light (cut-off at 260 nm)	
STRM-06HLKI-R	Recertification: STRM-06 + STRM-HL + STRM-KI	set
STRM-06HLSC	STRM-06 + STRM-HL + STRM-SC	set
	STRM-06 Potassium dichromate - UV absorbance and linearity Set of 2 cells: Each set consists of one blank (0.001M perchloric acid) and a solution with a nominal value of 60 mg/L.	
	STRM-HL Holmium oxide - UV and visible wavelength (Holmium oxide (4% m/v) in 10% v/v perchloric acid) Consists of one sealed cell, with certified peak at spectral bandwidth values of 0.10 nm, 0.25 nm, 0.50 nm, 1.00 nm, 1.50 nm, 2.00 nm and 3.00 nm.	
	STRM-SC Inorganic cut-off filter (sodium chloride; 1% aqueous) - UV stray light (cut-off at 205 nm)	
STRM-06HLSC-R	Recertification: STRM-06 + STRM-HL + STRM-SC	set
STRM-06HLKIBZ	STRM-06 + STRM-HL + STRM-KI + STRM-BZ	set
	STRM-06 Potassium dichromate - UV absorbance and linearity Set of 2 cells: Each set consists of one blank (0.001M perchloric acid) and a solution with a nominal value of 60 mg/L.	
	STRM-HL Holmium oxide - UV and visible wavelength (Holmium oxide (4% m/v) in 10% v/v perchloric acid) Consists of one sealed cell, with certified peak at spectral bandwidth values of 0.10 nm, 0.25 nm, 0.50 nm, 1.00 nm, 1.50 nm, 2.00 nm and 3.00 nm.	
	STRM-KI Inorganic cut-off filter (potassium iodide; 1% aqueous) - UV stray light (cut-off at 260 nm)	
	STRM-BZ Benzene vapour (0.1 mL benzene in the vapour state)	
STRM-06HLKIBZ-R	Recertification: STRM-06 + STRM-HL + STRM-KI + STRM-BZ	set
STRM-06HLKIKC	STRM-06 + STRM-HL + STRM-KI + STRM-KC	set
	STRM-06 Potassium dichromate - UV absorbance and linearity Set of 2 cells: Each set consists of one blank (0.001M perchloric acid) and a solution with a nominal values of 60 mg/L.	
	STRM-HL Holmium oxide - UV and visible wavelength (Holmium oxide (4% m/v) in 10% v/v perchloric acid) Consists of one sealed cell, with certified peak at spectral bandwidth values of 0.10 nm, 0.25 nm, 0.50 nm, 1.00 nm, 1.50 nm, 2.00 nm and 3.00 nm.	
	STRM-KI Inorganic cut-off filter (potassium iodide; 1% aqueous) - UV stray light (cut-off at 260 nm)	
	STRM-KC Inorganic cut-off filter (potassium chloride; 1.2% aqueous) - UV stray light (cut off at 200 nm)	
STRM-06HLKIKC-R	Recertification: STRM-06 + STRM-HL + STRM-KI + STRM-KC	set

Optical properties

Code	Product	Unit
STRM-06KIKCTX	STRM-06 + STRM-KI + STRM-KC + STRM-TX	set
	STRM-06 Potassium dichromate - UV absorbance and linearity Set of 2 cells: Each set consists of one blank (0.001M perchloric acid) and a solution with a nominal value of 60 mg/L.	
	STRM-KI Inorganic cut-off filter (potassium iodide; 1% aqueous) - UV stray light (cut-off at 260 nm)	
	STRM-KC Inorganic cut-off filter (potassium chloride; 1.2% aqueous) - UV stray light (cut-off at 200 nm)	
	STRM-TX Toluene in hexane - Resolution (0.020% v/v solution of toluene in hexane)	
STRM-06KIKCTX-R	Recertification: STRM-06 + STRM-KI + STRM-KC + STRM-TX	set
STRM-06HLKITX	STRM-06 + STRM-HL + STRM-KI + STRM-TX	set
	STRM-06 Potassium dichromate - UV absorbance and linearity Set of 2 cells: Each set consists of one blank (0.001M perchloric acid) and a solution with a nominal value of 60 mg/L.	
	STRM-HL Holmium oxide - UV and visible wavelength (Holmium oxide (4% m/v) in 10% v/v perchloric acid) Consists of one sealed cell, with certified peak at spectral bandwidth values of 0.10 nm, 0.25 nm, 0.50 nm, 1.00 nm, 1.50 nm, 2.00 nm and 3.00 nm.	
	STRM-KI Inorganic cut-off filter (potassium iodide; 1% aqueous) - UV stray light (cut-off at 260 nm)	
	STRM-TX Toluene in hexane - Resolution (0.020% v/v solution of toluene in hexane)	
STRM-06HLKITX-R	Recertification: STRM-06 + STRM-HL + STRM-KI + STRM-TX	set
STRM-06HLKCBZ	STRM-06 + STRM-HL + STRM-KC + STRM-BZ	set
	STRM-06 Potassium dichromate - UV absorbance and linearity Set of 2 cells: Each set consists of one blank (0.001M perchloric acid) and a solution with a nominal value of 60 mg/L.	
	STRM-HL Holmium oxide - UV and visible wavelength (Holmium oxide (4% m/v) in 10% v/v perchloric acid) consists of one sealed cell, with certified peak at spectral bandwidth values of 0.10 nm, 0.25 nm, 0.50 nm, 1.00 nm, 1.50 nm, 2.00 nm and 3.00 nm.	
	STRM-KC Inorganic cut-off filter (potassium chloride; 1.2% aqueous) - UV stray light (cut-off at 200 nm)	
	STRM-BZ Benzene vapour (0.1 mL benzene in the vapour state)	
STRM-06HLKCBZ-R	Recertification: STRM-06 + STRM-HL + STRM-KC + STRM-BZ	set
STRM-06SLLCBZ	STRM-06 + STRM-SL + STRM-LC + STRM-BZ	set
	STRM-06 Potassium dichromate - UV absorbance and linearity Set of 2 cells: Each set consists of one blank (0.001M perchloric acid) and a solution with a nominal value of 60 mg/L.	
	STRM-SL Samarium - UV and visible wavelength (Samarium (III) oxide in perchloric acid) consists of one sealed cell, with certified peak at spectral bandwidth values of 0.10 nm, 0.25 nm, 0.50 nm, 1.00 nm, 1.50 nm, 2.00 nm and 3.00 nm.	
	STRM-LC Inorganic cut-off filter (lithium carbonate; saturated aqueous) - UV stray light (cut off at 227 nm)	
	STRM-BZ Benzene vapour (0.1 mL benzene in the vapour state)	
STRM-06SLLCBZ-R	Recertification: STRM-06 + STRM-SL + STRM-LC + STRM-BZ	set
STRM-06HLSLKC	STRM-06 + STRM-HL+ STRM-SL + STRM-KC	set
	STRM-06 Potassium dichromate - UV absorbance and linearity Set of 2 cells: Each set consists of one blank (0.001M perchloric acid) and a solution with a nominal value of 60 mg/L.	
	STRM-HL Holmium oxide - UV and visible wavelength (Holmium oxide (4% m/v) in 10% v/v perchloric acid) Consists of one sealed cell, with certified peak at spectral bandwidth values of 0.10 nm,0.25 nm, 0.50 nm, 1.00 nm, 1.50 nm, 2.00 nm and 3.00 nm.	
	STRM-SL Samarium - UV and visible wavelength (Samarium (III) oxide in perchloric acid) Consists of one sealed cell, with certified peak at spectral bandwidth values of 0.10 nm, 0.25 nm, 0.50 nm, 1.00 nm, 1.50 nm, 2.00 nm and 3.00 nm.	
	STRM-KC Inorganic cut-off filter (potassium chloride; 1.2% aqueous) - UV stray light (cut-off at 200 nm)	
STRM-06HLSLKC-R	Recertification: STRM-06 + STRM-HL+ STRM-SL + STRM-KC	set
STRM-06HLKCSITX	UV single absorbance instrument spec. kit	set
	Each set consists on STRM-06 + STRM-HL + STRM-KC + STRM-SI + STRM-TX	
	STRM-06 Potassium dichromate - UV absorbance and linearity Set of 2 cells: Each set consists of one blank (0.001M perchloric acid) and a solution with a nominal value of 60 mg/L.	
	STRM-HL Holmium oxide - UV and visible wavelength (Holmium oxide (4% m/v) in 10% v/v perchloric acid) Consists of one sealed cell, with certified peak at spectral bandwidth values of 0.10 nm,0.25 nm, 0.50 nm, 1.00 nm, 1.50 nm, 2.00 nm and 3.00 nm.	
	STRM-KC Inorganic cut-off filter (potassium chloride; 1.2% aqueous) - UV stray light (cut-off at 200 nm)	
	STRM-SI Inorganic cut-off filter (sodium iodide; 1% aqueous) - UV stray light (cut-off at 260 nm)	
	STRM-TX Toluene in hexane - Resolution (0.020% v/v solution of toluene in hexane)	
STRM-06HLKCSITX-R	Recertification: UV single absorbance instrument spec. kit	set

Code	Product	Unit
STRM-0660HLKCSITX	UV and visible instrument spec. kit Each set consists on STRM-06 + STRM-60 + STRM-HL + STRM-KC + STRM-SI + STRM-TX STRM-06 Potassium dichromate - UV absorbance and linearity Set of 2 cells: Each set consists of one blank (0.001M perchloric acid) and a solution with a nominal value of 60 mg/L. STRM-60 Potassium dichromate - UV absorbance and linearity Set of 2 cells: Each set consists of one blank (0.001M perchloric acid) and a solution with a nominal value of 600 mg/L STRM-HL Holmium oxide - UV and visible wavelength (Holmium oxide (4% m/v) in 10% v/v perchloric acid) Consists of one sealed cell, with certified peak at spectral bandwidth values of 0.10 nm, 0.25 nm, 0.50 nm, 1.00 nm, 1.50 nm, 2.00 nm and 3.00 nm. STRM-KC Inorganic cut-off filter (potassium chloride; 1.2% aqueous) - UV stray light (cut-off at 200 nm) STRM-SI Inorganic cut-off filters (sodium iodide; 1% aqueous) - UV stray light (cut-off at 260 nm) STRM-TX Toluene in hexane - Resolution (0.020% v/v solution of toluene in hexane)	set
STRM-0660HLKCSITX-R	Recertification: UV and visible instrument spec. kit	set
STRM-06HLKCTX	Pharmacopoeia kit Each set consists on STRM-06 + STRM-HL + STRM-KC + STRM-TX STRM-06 Potassium dichromate - UV absorbance and linearity Set of 2 cells: Each set consists of one blank (0.001M perchloric acid) and a solution with a nominal value of 60 mg/L. STRM-HL Holmium oxide - UV and visible wavelength (Holmium oxide (4% m/v) in 10% v/v perchloric acid) Consists of one sealed cell, with certified peak at spectral bandwidth values of 0.10 nm, 0.25 nm, 0.50 nm, 1.00 nm, 1.50 nm, 2.00 nm and 3.00 nm. STRM-KC Inorganic cut-off filter (potassium chloride; 1.2% aqueous) - UV stray light (cut-off at 200 nm) STRM-TX Toluene in hexane - Resolution (0.020% v/v solution of toluene in hexane)	set
STRM-06HLKCTX-R	Recertification: Pharmacopoeia kit	set
STRM-0660HLKCTX/R/UG	Upgrade/recert. of pharmacopoeia kit (STRM-06HLKCTX) to E.P. 5.2 In version 5.2 of the Euro. Pharm., in section 2.2.25, they added an additional Absorbance verification using a 600 mg/l solution of potassium dichromate at 430 nm. The upgrade price adds this 600 mg/L reference to the existing Euro. Pharm. set, and re-certifies all the existing materials.	set
STRM-0660HLKCTXE.P. 5.2	Pharmacopoeia kit Each set consists of STRM-06 + STRM-60 + STRM-HL + STRM-KC + STRM-TX STRM-06 Potassium dichromate - UV absorbance and linearity Set of 2 cells: Each set consists of one blank (0.001M perchloric acid) and a solution with a nominal value of 60 mg/L. STRM-60 Potassium dichromate - UV absorbance and linearity Set of 2 cells: Each set consists of one blank (0.001M perchloric acid) and a solution with a nominal value of 600 mg/L STRM-HL Holmium oxide - UV and visible wavelength (Holmium oxide (4% m/v) in 10% v/v perchloric acid) Consists of one sealed cell, with certified peak at spectral bandwidth values of 0.10 nm, 0.25 nm, 0.50 nm, 1.00 nm, 1.50 nm, 2.00 nm and 3.00 nm. STRM-KC Inorganic cut-off filter (potassium chloride; 1.2% aqueous) - UV stray light (cut-off at 200 nm) STRM-TX Toluene in hexane - Resolution (0.020% v/v solution of toluene in hexane)	set
STRM-0660HLKCTX-R	Recertification: E.P. 5.2 Pharmacopoeia kit	set
STRM-1A2A3A4ARE	Far UV combination kit Each set consists on STRM-1A2A3A4A + STRM-RE	set
STRM-1A2A3A4ARE-R	Recertification: Far UV combination kit	set
STRM-020610HLKCTX	Single Box 3-point linearity full spec. kit (9 cells) Each set consists on STRM-02 + STRM-06 + STRM-10 + STRM-HL + STRM-KC + STRM-TX STRM-02 Potassium dichromate - UV absorbance and linearity Set of 2 cells: Each set consists of one blank (0.001M perchloric acid) and a solution with a nominal value of 20 mg/L. STRM-06 Potassium dichromate - UV absorbance and linearity Set of 2 cells: Each set consists of one blank (0.001M perchloric acid) and a solution with a nominal value of 60 mg/L. STRM-10 Potassium dichromate - UV absorbance and linearity Set of 2 cells: Each set consists of one blank (0.001M perchloric acid) and a solution with a nominal values of 100 mg/L. STRM-HL Holmium oxide - UV and visible wavelength (Holmium oxide (4% m/v) in 10% v/v perchloric acid) Consists of one sealed cell, with certified peak at spectral bandwidth values of 0.10 nm, 0.25 nm, 0.50 nm, 1.00 nm, 1.50 nm, 2.00 nm and 3.00 nm. STRM-KC Inorganic cut-off filter (potassium chloride; 1.2% aqueous) - UV stray light (cut-off at 200 nm) STRM-TX Toluene in hexane - Resolution (0.020% v/v solution of toluene in hexane)	set

Optical properties

Code	Product	Unit
STRM-020610HLKCTX-R	Recertification: Single Box 3-point linearity full spec. kit (9 cells)	set

NIR

STRM-RM-NIR	Certified NIR wavelength reference for transmittance measurements	cuV.
	Liquid reference material, permanently heat-fused sealed in a high quality far-uv quartz cuvette. Configuration Transmittance: 10 mm optical path length, both linear path optical window clear, opposed sides "grey" Certification: Complete with certificate of wavelength values and associated expanded uncertainty, for 13 assigned peak values in the range 950 - 2550 nm.	
STRM-RM-NIR/T	Certified NIR wavelength reference for transmittance and trans-flectance measurements	cuV.
	Liquid reference material, permanently heat-fused sealed in a high quality far-uv quartz cuvette. Configuration Transmittance/Trans-flectance: 5 mm or 10 mm optical path length, depending on orientation, In 5 mm configuration, rear window mirror coated to provide reflectance optical return - so path length effectively 2 x 4 = 10 mm Certification: Complete with certificate of wavelength values and associated expanded uncertainty, for 13 assigned peak values in the range 950 - 2550 nm.	

Reference material for nucleic acid analysis

New STDNACON260280	Wavelength accuracy in critical nucleic acid measurements - 260/280 nm measurement ratio	cell
	This control material has been specifically designed to assure the wavelength accuracy in critical nucleic acid measurements. DNACON260/280 which suffers from none of the inherent stability problems associated with DNA has been created for use as a new reliable NIST traceable Quality Control Standard by clinical and bioscience laboratories analysing and evaluating the purity of a range of nucleic acids such as DNA, RNA, RNAi and ssDNA. It consists of a Far UV quartz cell which has been permanently sealed by heat fusion. It contains a solution of Starna DNACON 260/280, which has been designed to give a spectrophotometric 260/280 nm measurement ratio similar to that achieved when measuring pure DNA. This standard is produced in an ISO 17025 and ISO Guide 34 accredited environment, meeting the highest available regulatory standards.	

Refractive index

New ERM-BD011	Orange juice	3 mL
	This certified reference material is intended for use in the development, validation or quality control of analytical methods for the determination of degrees Brix or Refractive Index of sugar solutions and food extracts. Certified values Degrees Brix 1.26 Refractive index..... 1.3348	
New ERM-BD012	Orange juice	3 mL
	This certified reference material is intended for use in the development, validation or quality control of analytical methods for the determination of degrees Brix or Refractive Index of sugar solutions and food extracts. Certified values Degrees Brix 12.72 Refractive index..... 1.3521	
New ERM-BD013	Orange juice	3 mL
	This certified reference material is intended for use in the development, validation or quality control of analytical methods for the determination of degrees Brix or Refractive Index of sugar solutions and food extracts. Certified values Degrees Brix 22.07 Refractive index..... 1.3673	
New ERM-BD014	Orange juice	3 mL
	This certified reference material is intended for use in the development, validation or quality control of analytical methods for the determination of degrees Brix or Refractive Index of sugar solutions and food extracts. Certified values Degrees Brix 55.55 Refractive index..... 1.4320	
New ERM-BD015	Orange juice	3 mL
	This certified reference material is intended for use in the development, validation or quality control of analytical methods for the determination of degrees Brix or Refractive Index of sugar solutions and food extracts. Certified values Degrees Brix 64.73 Refractive index..... 1.4529	
NIST-1822a	Refractive index standard	plate
	Certified values	
	Vacuum Wavelength (nm)	Refractive Index (n) at 22 °C
	480.1254	1.526132 ± 0.000016
	501.7077	1.524468 ± 0.000016
	508.7240	1.523971 ± 0.000016
	Vacuum Wavelength (nm)	Refractive Index (n) at 22 °C
	546.2260	1.521629 ± 0.000016
	587.7254	1.519535 ± 0.000016
	644.0250	1.517277 ± 0.000016

Code	Product	Unit
NIST-1922	Liquid refractive index - Mineral oil Intended for use as a calibration material for refractometers, especially for the refractive index range applicable to solutions of sugar and water. Certified values are given for refractive indices at 6 wavelengths, in the visible light range, at 20°C and for the change in refractive index with respect to temperature.	30 mL
	PRG 7.21 - PRG 7.8 This group of liquid reference materials, produced by LGC Standards and certified by the Laboratory of Refractometry and Polarimetry of the Central Office of Measures (GUM), Warsaw, covers the wide range of refractive index from 1.333 (water) to 1.657 (1-Bromonaphthalene). The <i>n</i> values were determined on a Pulfrich refractometer, previously calibrated with solid Class 1 CRMs, for which values were established using goniometric procedures. All reference materials are supplied with a certificate. Certified values to 5 significant figures for the refractive index at $\lambda = 589.3$ nm, $t = 20^\circ\text{C}$ and associated uncertainties are given. Reference liquids are packed in glass ampoules (7.1, 7.2, 7.5, 7.6, 7.8) or plastic drop-bottles (7.11, 7.12, 7.20, 7.21).	
PRG 7.21	Water Refractive index.....1.333 at 20 °C	10 mL
PRG 7.1	2,2,4-Trimethylpentane Refractive index.....1.391 at 20 °C	10 mL
PRG 7.11	Methylsilicone oil Refractive index.....1.405 at 20 °C	10 mL
PRG 7.2	Methylcyclohexane Refractive index.....1.423 at 20 °C	10 mL
PRG 7.12	Silicone oil DC 556 Refractive index.....1.462 at 20 °C	10 mL
PRG 7.20	Paraffin oil Refractive index.....1.475 at 20 °C	10 mL
PRG 7.5	Toluene Refractive index.....1.496 at 20 °C	10 mL
PRG 7.6	Chlorobenzene Refractive index.....1.524 at 20 °C	10 mL
PRG 7.8	1-Bromonaphthalene Refractive index.....1.657 at 20 °C	10 mL
RPC18061	Refractive index liquids Refractive index range: 1.400-1.458 (interval 0.002)	30 x 7 mL
RPC18062	Refractive index liquids Refractive index range: 1.400-1.458 (interval 0.004)	15 x 7 mL
RPC18065	Refractive index liquids Refractive index range: 1.400-1.458 (interval 0.01)	6 x 7 mL
RPC1806X	Refractive index liquid Any individual standard* Refractive index range: 1.400-1.458 (interval 0.002)	7 mL
RPC1806Y	Refractive index liquid Any individual standard Refractive index range: 1.400-1.458 (interval 0.002)	30 mL
RPC18091	Refractive index liquids Refractive index range: 1.460-1.640 (interval 0.002)	91 x 7 mL
RPC18092	Refractive index liquids Refractive index range: 1.460-1.640 (interval 0.004)	46 x 7 mL
RPC18095	Refractive index liquids Refractive index range: 1.460-1.640 (interval 0.01)	19 x 7 mL
RPC1809X	Refractive index liquid Any individual standard* Refractive index range: 1.460-1.640 (interval 0.002)	7 mL
RPC1809Y	Refractive index liquid Any individual standard* Refractive index range: 1.460-1.640 (interval 0.002)	30 mL

Optical properties

Code	Product	Unit
RPC18121	Refractive index liquids Refractive index range: 1.642-1.700 (interval 0.002)	30 x 7 mL
RPC18122	Refractive index liquids Refractive index range: 1.642-1.700 (interval 0.004)	15 x 7 mL
RPC18125	Refractive index liquids Refractive index range: 1.642-1.700 (interval 0.01)	6 x 7 mL
RPC1812X	Refractive index liquids Any individual standard* Refractive index range: 1.642-1.700 (interval 0.002)	7 mL
RPC1812Y	Refractive index liquid Any individual standard* Refractive index range: 1.642-1.700 (interval 0.002)	30 mL

*For individual standards please state in brackets after the catalogue number the refractive index required.

Please enquire at your local office about Brix liquid standards and Master Calibration standards.

Optical rotation

New NIST-17F	Sucrose - Optical rotation Intended for use as a saccharimetry standard in calibrating polarimetric systems. Certified purity.....99.956 ± 0.004 % Reference values are given for optical rotation, °Z at 546.2271 nm and specific rotation at 589.4400 nm.	60 g
GUM 8.1	Sucrose (Saccharose) Certified values Optical rotation at 20 °C 546 nm.....78.34 ° 589 nm 66.52 °	100 g

Optical fibres

NIST-2520	Optical fibre diameter standard - Diameter Intended for calibrating video microscopes or gray-scale systems used for fibre geometry measurements. The material consists of bare fibre in aluminium housing. Each sample is individually calibrated.	unit
NIST-2522	Pin Guage for Optical Fibre Ferrul This Standard Reference Material (SRM [®]) is intended primarily for use in calibrating instruments which measure small diameter artifacts such as pin gages, used for optical fibre ferrule hole calibration. Each SRM is individually certified and consists of a 60 mm long steel wire.	Each
NIST-2523	Optical Fibre Ferrule Geometry This Standard Reference Material (SRM [®]) is intended primarily for use in calibrating instruments which measure small diameter artifacts such as optical fibre ferrules. Each SRM is individually certified and consists of a single ceramic optical fibre ferrule.	Each

Colour measurement

BCR-400	Red ceramic tile (Tomato paste colour) 100 mm x 100 mm A ceramic tile the colour of which is defined by Hunter L, a and b values. Each tile is individually certified. The tile is intended for the purpose of calibration and does not represent a standard tomato paste colour.	unit
BCR-406A	A reference for colorimeters and spectrophotometers measuring colour in reflection. The spectral reflectance is certified at 13 wavelengths between 400 nm and 1200 nm with a value higher than 93% between 450 nm and 800 nm. The specimens are circular plates 14 mm thick. One size available: 50mmD. One side is polished, and the other is mat.	
BCR-406A	Opal glass 50 mmD x 14 mm thick	disc

Photography

NIST-1010a	Microcopy resolution test chart Intended to be used to determine the resolving power of microcopy systems in the photographic industry. Designed to meet the general requirements for ISO test chart No. 2 as described in ISO 3334: 1989.	set
NIST-5001	Two-Dimensional Grid Photomask Standard This Standard Reference Material (SRM [®]) is intended primarily for calibrating high accuracy two dimensional (X-Y) photomask/reticle registration metrology tools such as the IPRO, the IPRO II and the Leica 2020 as well as older tools such as the Nikon 5i.	Each