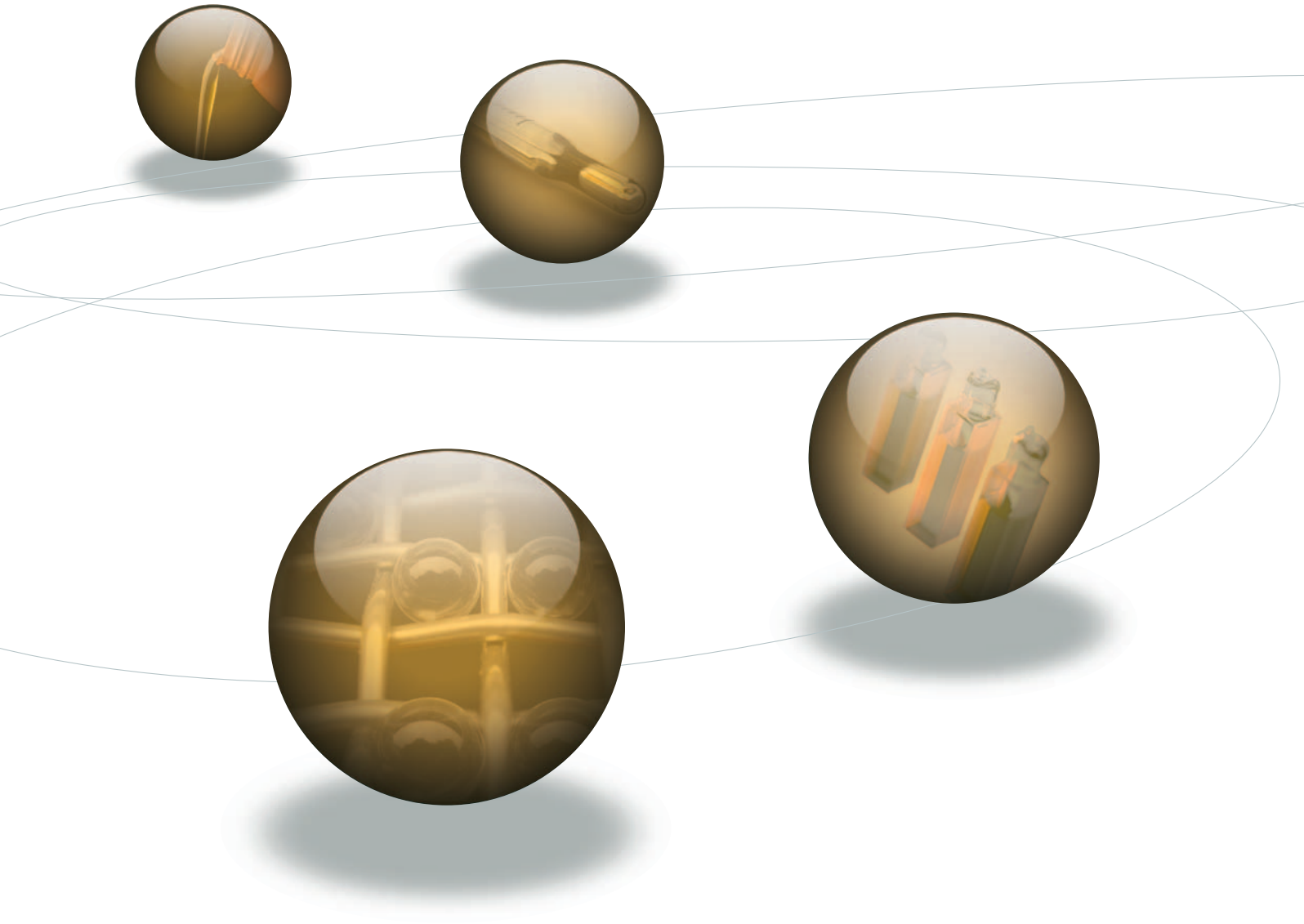
Reference materials for physical properties 2008/2009



LGC Standards

Excellence through measurement

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- Madagascar
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- Syria
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- Egypt
- Germany
- Greece
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- Iran
- Israel
- Japan
- Korea
- Macau
- Netherlands
- Romania
- Slovenia
- Switzerland
- Thailand
- Turkey

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- Russia
- Slovakia
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Your LGC Standards account number _____

Your contact at LGC Standards is

Name: _____

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For countries not listed above, please contact our head office.

Content

Introduction

About the catalogue

For manufacturers of a wide variety of products, the determination of the physical properties of their product can be one of the most important steps in assuring quality. LGC Standards is pleased to present the catalogue "Reference materials for physical properties". This is the third catalogue from LGC Standards featuring a comprehensive collection of reference materials intended purely for the determination of physical properties.

The catalogue lists a large range of reference materials and standards covering many physical properties including thermal, surface properties, particle shape and size, ion activity, viscosity, electrical, and polymeric properties. Of particular interest are products for the determination of optical properties such as molecular absorption, luminescence, colour measurement and refractive index. Also featured are the old favourites such as melting point standards and standards for use with differential scanning calorimetry (DSC).

The range includes reference materials and standards from commercial sources as well as national and international bodies and each product is accompanied by a certificate of analysis. The catalogue has been designed to be simple to use; it provides a brief description of the products with details of the relevant parameters from the certificate of analysis.

About LGC Standards

LGC Standards is Europe’s most comprehensive source of reference materials. We work closely with the leading manufacturers to offer laboratories worldwide improved access to reference materials, all designed to cover an increasingly large range of parameters.

Our network of offices in Europe and India combined with our extensive experience in selling reference materials and our technical expertise, allow LGC Standards to work in partnership with our customers to provide fast delivery together with good technical advice as well as dealing with complex import and export regulations.

LGC Standards is part of LGC, whose Research and Technology Division acts as the designated UK National Measurement Institute (NMI) for Chemical and Biochemical measurement, and has a long history in the development and validation of analytical methods and the production of reference materials.

Many of the analytical methods, which cover the food, environment, industrial, clinical and pharmaceutical sectors, are accredited to ISO/IEC 17025 (Requirements for the competency of testing and calibration laboratories). Full details of the accreditation schedule can be found on the UKAS website www.ukas.com.

LGC's Research and Technology Division is accredited to ISO Guide 34 (General Requirements for the competence of reference materials producers) for the production of reference materials. The measurement capabilities used to produce certified reference materials in its capacity as the UK NMI are verified through participation on key comparison studies organised by the Consultative Committee for the Amount of Substance (CCQM) of the International Weights and Measures Organisation (BIPM). The certificates are recognised by other National Measurement Institutes, under the Mutual Recognition Arrangement.

In its role as the NMI, LGC serves on the International Organisation for Standardisation (ISO) Committee for Reference Materials (REMCO), which aims to carry out and encourage a broad international effort for the harmonization, production and application of certified reference materials (CRMs).

LGC has a long history in the development and validation of analytical methods and the reference materials production facility at LGC complements this expertise. LGC offers a range of chemical and bio-analytical laboratory services across a variety of industries including: food and agriculture, environment, life sciences, chemicals and forensic science. LGC also plays a pivotal role in a number of programmes with both government and industry to improve analytical standards and laboratory performance.

Producers of reference materials

IRMM

BCR® and IRMM reference materials (BCR® is a registered trademark of JRC-EC-IRMM) are the products of both research funding and direct action programmes of the European Commission, in which new or improved measurement or testing methods are developed. These programmes are aimed at improving, harmonising or standardising measurements and testing in the European Union.

As an authorised distributor of BCR® reference materials LGC Standards currently holds stock of more than 5000 units of certified BCR® and IRMM reference materials under carefully controlled and monitored conditions.

European Reference Materials (ERM®)

The ERM® range of reference materials was launched in May 2004. It is the result of collaboration between three major reference material producers, LGC in the UK, the Institute for Reference Materials and Measurement (IRMM) in Belgium and Bundesanstalt für Materialforschung und Prüfung (BAM) in Germany. The partners are committed to using the most advanced principles for the production of certified reference materials. The certified values have clearly defined and stated traceability and are internationally recognized through participation of the partners in key comparisons organized by the Bureau International des Poids et Mesures (BIPM). All ERM® materials are subject to rigorous homogeneity and stability testing guaranteeing the certified values for every unit over its complete shelf life.

The National Institute of Standards and Technology (NIST)

NIST produces standard reference materials (SRMs®). Based in the United States, NIST has provided reference materials to industry and commerce for nearly 100 years. NIST collaborates with companies to provide academia and industry with SRMs for expanding areas such as air and water pollution, which are international issues.

Others

Materials from the following organisations are also included in this catalogue:

- National Research Centre for Certified Reference Materials, China
- AEA Technology, UK
- Whitehouse Scientific Ltd, UK
- Optiglass Ltd, UK
- Cargille Laboratories Inc., USA
- H & D Fitzgerald Ltd, UK
- GE Sensing, UK
- Poulten Selfe & Lee Ltd, UK
- Stanhope-Seta, UK
- Federal Institute for Materials Research and Testing, Germany
- LabStand Production & Service Company, Poland
- Central Office of Measures (GUM), Poland

The use of reference materials

Reference materials are instrumental in ensuring the reliability of analytical measurements and so avoiding the use of poor quality data as the basis of decision making.

When choosing a matrix reference material for a particular application the analyst should consider the following factors before selecting a material:

- Matrix match and potential interferences
- Analytes
- Measurement range
- Measurement uncertainties
- Certification procedures used by the producer
- Documentation supplied with the material (e.g. certificate or report).

About proficiency testing (PT)

Proficiency testing (PT) is a powerful quality assurance tool for laboratories undertaking analytical measurements. A PT scheme provider distributes test materials on a regular basis to participating laboratories for independent testing.The results are returned to the organiser of the scheme who makes an analysis of the results and provides a report to all the participants.

There are a number of benefits of taking part in a PT scheme:

- Provides laboratories with a mechanism to compare their measurements with others
- Enables laboratories to demonstrate the quality of their results to third parties e.g. customers, regulators and accreditation bodies
- Facilitates the monitoring of trends, over time, in the quality of measurements
- Assists the evaluation of methods and instrumentation
- Helps and educates laboratory staff and their customers

The LGC Proficiency Testing Group (incorporating Quality Management Ltd and Aquacheck Ltd) is a major international provider of proficiency testing services. It has over twenty years experience in all aspects associated with the provision of proficiency testing services to laboratories undertaking chemical and microbiological analysis. Schemes of relevance to a wide range of sectors are available and most of them are run on an international basis. All LGC schemes are accredited by the United Kingdom Accreditation Service (UKAS).

Current schemes provided include:

Environmental:

· AQUACHECK - chemical analysis of clean waters, waste waters, sludges, sediments and soils

· QWAS - microbiological assessment of waters, effluents and sludges

· CONTEST - analysis of contaminated soils for a wide range of contaminants

Food:

· QMS - microbiological examination of food and food ingredients

· QDCS - composition and safety testing in the dairy sector

· QMAS - chemical analysis of meat

· QGS - analysis of gelatine samples

· QCS - microbiological testing of chocolate

· QFCS - chemical testing of food products

Beverage:

· BAPS - chemical, microbiological and sensory analysis of a range of beers.

· DAPS - analysis of a wide range of alcoholic beverages (except beer)

· QBS - microbiological and chemical testing of soft drinks

· SODAS - chemical analysis of carbonated and still soft drinks

· MAPS - analysis of malt and barley used by the malting, brewing and distilling industries

· SUPS - analysis of raw sugar used in soft drink production.

Others:

· QMIS - identification of micro organisms

· PHARMASSURE - measurement of a range of analytes in pharmaceutical products used in hospitals

· QUARTZ - toxicological analysis of drugs in post-mortem blood

· TOYTEST - toy safety testing to the European Standard EN71 and American Standard ASTM F963

In addition to these regular schemes LGC is also able to offer customised or closed proficiency testing schemes tailored to a specific organisation’s requirements.

LGC schemes are now available either through LGC Standards or through your local distributor.

Please contact your local LGC Standards office to find out more.

Relevant literature

Applications of Reference Materials in Analytical Chemistry VAM
V. Barwick, S. Burke, R. Lawn, P. Roper and R. Walker RSC

Reference Materials in Analytical Chemistry – A Guide for Selection and Use
A. Zchunke published by Springer-Verlag.

Reference Materials for Chemical Analysis – Certification, Availability and Proper Usage
M. Stoeppler, W.R. Wolf, P.J. Jenks published by Wiley-VCH.

Proficiency Testing in Analytical Chemistry, R.Lawn, M.Thompson and R.Walker published by The Royal Society of Chemistry.

Relevant training courses

A range of training courses is available from LGC to help laboratory managers and analysts demonstrate competence in, and keep abreast of, quality assurance issues and practices. LGC's analytical quality training programme includes:

- Achieving traceability in chemical testing
- Using proficiency testing in the analytical laboratory
- Method validation
- Principles and practice of measurement uncertainty in chemical testing laboratories
- Quality systems in testing laboratories
- Statistics for analytical chemists
- Further statistical tools for analytical chemists
- Evaluating measurement uncertainty for chemical testing laboratories

The majority of the courses are run in Teddington, South West London, UK. In addition, LGC can provide training for groups of staff at your own site, where the courses can be customised to meet your exact needs. For further information, please contact:

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Web: www.lgc.co.uk

Glowell™ standards

The measurement of light output from luminescence and fluorescence experiments is amongst the most common methods used in bio-analytical applications. The Glowell™ range of light output standards provide a known and traceable light source for the calibration of luminometers, bioimaging systems and quantitative PCR instruments. The standards are available in a variety of different wavelengths and formats to suit many different applications.

Glowell™ standards generate a constant light output over a range of different wavelengths and intensities using a gaseous tritium source. A Glowell™ device is particularly useful in experimental applications that require the comparison of light output data from different experiments or instruments. Each Glowell™ unit can be placed in a single microplate well and can therefore be included in the same plate as the samples being analysed. Each Glowell™ product is provided with a certificate of analysis and is guaranteed to produce a stable light output for a period of year.

The Glowell™ Low Light Imaging standards can be used for the calibration of CCD or low light cameras and the validation of experimental data using this equipment.

Code	Product	Unit
LUX-GLO-001	Glowell 96 Well Microplate Standard (Green Light)	KIT
LUX-GLO-002	Glowell 96 Well Microplate Standard (Blue Light)	KIT
LUX-GLO-003	Glowell 96 Well Microplate Standard (Red Light)	KIT
LUX-GLO-004	Glowell 96 Well Microplate Standard (Yellow Light)	KIT
LUX-GLO-010	Glowell 384 Well Microplate Standard (Green Light)	KIT
LUX-GLO-011	Glowell 384 Well Microplate Standard (Blue Light)	KIT
LUX-GLO-012	Glowell 384 Well Microplate Standard (Red Light)	KIT
LUX-GLO-013	Glowell 384 Well Microplate Standard (Yellow Light)	KIT
LUX-GLO-014	Glowell Low Light Imaging Standard (Green Light)	Unit
LUX-GLO-015	Glowell Low Light Imaging Standard (Blue Light)	Unit
LUX-GLO-016	Glowell 96 Well Microplate Standard (2 colour, combination)	KIT

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

Code	Product	Unit
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
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-2234	Gallium - DSC calibration standard Certified values Enthalpy of fusion.....80.097 kJ/g Fusion temperature .....302.9146 K	2 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

Thermal properties

Code	Product	Unit
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-aminobezoic 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
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 point ..... 80.11 °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	500 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 point ..... 94.55 °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 point 113.94 °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 0.25 g
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.^ Certified values Thermodynamic melting point ..... 147.05 °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	500 mg

Code	Product	Unit
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 point..... 183.09 °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 point..... 209.12 °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
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	500 mg
LGC2410	Anthraquinone - 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..... 284.48 °C Dynamic melting points (0.2 °C/min heating rate): Onset of melting..... 284.08 °C Meniscus point ..... 284.38 °C Liquefaction point..... 284.65 °C	500 mg
NCS AS93109	Azobenzol - Melting point Certified melting point ..... 68.34 °C	2 g
NCS AS93102B	Napthalene - Melting point Certified melting point ..... 80.08 °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
NCS AS93103B	Benzoic acid - Melting point Certified melting point ..... 122.35 °C	2 g
NCS AS93112	p-Acetophenetidine - Melting point Certified melting point ..... 134.96 °C	2 g
NCS AS93104B	1,6-Adipic acid - Melting point Certified melting point ..... 151.62 °C	2 g
NCS AS93113	Albexan - Melting point Certified melting point ..... 164.70 °C	2 g
NCS AS93105A	Anisic acid - Melting point Certified melting point ..... 183.28 °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
NCS AS93106	Anthracene - Melting point Certified melting point ..... 215.88 °C	2 g

Thermal properties

Code	Product	Unit
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
NCS AS93107B	p-Nitrobenzoic acid - Melting point Certified melting point ..... 239.58 °C	2 g
NCS AS93101B	4-Nitrotoluene - Melting point Certified melting point ..... 51.61 °C	2 g
NCS AS93119	Chocolax - Melting point Certified melting point ..... 261.43 °C	2 g
NCS AS93108B	Anthraquinone - Melting point Certified melting point ..... 284.55 °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-1744	Aluminium - Freezing point For use in defining fixed points of the International Temperature Scale of 1990 (ITS-90). Certified freezing point ..... 660.323 °C	200 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	1 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	1 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 point..... 29.7646 °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

Code	Product	Unit
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 point..... 39.30 °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 point..... 58.0642 °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 point..... 156.598 °C	60 g
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 HHV* (dry, ash free)..... 17.40 ± 0.30 MJ/kg Dry ash ..... 20.34 ± 0.54 wt% *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 Ash content, Gross calorific value	50 g
NIST-2684B	Coal (bituminous) - Sulphur, mercury and heat of combustion Certified values S..... 3.076 % Hg..... 97.4 µg/kg Heat of combustion ..... 28.56 MJ/kg Indicative values for Ash content, Gross calorific value	50 g

Thermal properties

Code	Product	Unit
NIST-2685B	Coal - Sulphur, mercury and heat of combustion This Standard Reference Material (SRM®) is intended primarily for use in the evaluation of techniques employed in the determination of sulphur, mercury, ash content, and calorific value (MJ·kg-1) in coal and materials of a similar matrix. NIST-2685b consists of 50 g of bituminous coal ground to pass a 250 µm (60 mesh) sieve, homogenized, and packaged in an amber glass bottle. Certified values S ..... 4.730 % Cl ..... 517 mg/kg Hg ..... 146.2 µg/kg Indicative values for the ash content, gross calorific value and elements	50 g
NIST-2692b	Coal (bituminous) - Sulphur, mercury and gross calorific value Certified values S ..... 1.170 % ± 0.020 % Hg ..... 133.3 µg/kg ± 4.1 µg/kg Reference values Ash Content (mass fraction) ..... 7.90 % Gross Calorific Value ..... 32.81 MJ/kg	50 g

Solution calorimetry

Code	Product	Unit
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

Vapour pressure

Code	Product	Unit
NIST-746	Cadmium - vapour pressure Certified values for vapour pressure as a function of temperature (350-594 K)	1 rod

Thermal conductivity

Code	Product	Unit
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
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)	1 rod
BCR-039A	Pyrex glass - Thermal conductivity 30 cm x 30 cm x 20 mm Certified value (23 °C) λ ..... 1.143 8 W/m.K The function to calculate λ for temperature between –75 and 195 °C is given in the CoA	board
BCR-039B	Pyrex glass - Thermal conductivity 30 cm x 30 cm x 30 mm Certified value (23 °C) λ ..... 1.143 8 W/m.K The function to calculate λ for temperature between –75 and 195 °C is given in the CoA	board
BCR-039C	Pyrex glass - Thermal conductivity 30 cm x 30 cm x 50 mm Certified value (23 °C) λ ..... 1.143 8 W/m.K The function to calculate λ for temperature between –75 and 195 °C is given in the CoA	board

Code	Product	Unit
BCR-724A	Glass-ceramic - Thermal diffusivity, thermal conductivity Rod in container (diam.= 13.0 mm height > 18 mm) Thermal diffusivity, α Certified value [$m^2/s \cdot 10^{-6}$] $\alpha = 4.406 - 1.351.10^{-2} \cdot T + 2.133 \cdot 10^{-5} \cdot T^2 - 1.541 \cdot 10^{-8} \cdot T^3 + 4.147 \cdot 10^{-12} T^4$ 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 [$m^2/s \cdot 10^{-6}$] $\alpha = 4.406 - 1.351.10^{-2} \cdot T + 2.133 \cdot 10^{-5} \cdot T^2 - 1.541 \cdot 10^{-8} \cdot T^3 + 4.147 \cdot 10^{-12} T^4$ 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 [$m^2/s \cdot 10^{-6}$] $\alpha = 4.406 - 1.351.10^{-2} \cdot T + 2.133 \cdot 10^{-5} \cdot T^2 - 1.541 \cdot 10^{-8} \cdot T^3 + 4.147 \cdot 10^{-12} T^4$ 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 [$m^2/s \cdot 10^{-6}$] $\alpha = 4.406 - 1.351.10^{-2} \cdot T + 2.133 \cdot 10^{-5} \cdot T^2 - 1.541 \cdot 10^{-8} \cdot T^3 + 4.147 \cdot 10^{-12} T^4$ 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 [$m^2/s \cdot 10^{-6}$] $\alpha = 4.406 - 1.351.10^{-2} \cdot T + 2.133 \cdot 10^{-5} \cdot T^2 - 1.541 \cdot 10^{-8} \cdot T^3 + 4.147 \cdot 10^{-12} T^4$ Uncertainty:6.1% Thermal conductivity, λ Certified value [W/(m·K)] $\lambda = 2.332 + 515.1/T$ Uncertainty:6.5%	rod

Thermal properties

Thermal expansion

Code	Product	Unit
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)	51x6.4 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-1450C	Fibrous glass board 61 cm x 61 cm x 2.54 cm Certified values for thermal resistance as a function of bulk density and temperature (280-340 K)	board
NIST-1452	Fibrous glass blanket for high precison 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 (HFM). 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
NIST-1453	Expanded polystyrene board 93 cm x 66 cm x 1.34 cm Certified values for thermal resistance as a function of bulk density and temperature (285-310 K)	board

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. A (boat) Certified value .....988 °C B (perforated plate) 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-934	Clinical laboratory thermometer Calibrated at 4 temperatures 0, 25, 30 and 37 °C	unit
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 Themometer 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
AEA1001	Aerosol fibre analogue shape standard (aqueous suspension) Reference values: Particles per vial 1.0 x 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.	10 mL
	BCR-066 - BCR-132 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.	
BCR-066	Quartz - Stokes' diameter Certified value Stokes' diameter ..... 0.35 - 3.50 µm	10 g
BCR-067	Quartz - Stokes' diameter Certified values Stokes' diameter ..... 2.4 - 32 µm	10 g
BCR-068	Quartz - Volume diameter Certified values Volume diameter ..... 160 - 630 µm	100 g
BCR-069	Quartz - Stokes' diameter Certified values Stokes' diameter ..... 14 - 90 µm	10 g
BCR-070	Quartz - Stokes' diameter Certified values Stokes' diameter ..... 1.2 - 20 µm	10 g
BCR-130	Quartz - Volume diameter Certified values Volume diameter ..... 50 - 220 µm	50 g
BCR-131	Quartz - Volume diameter Certified value Volume diameter ..... 480 - 1800 µm	200 g
BCR-132	Quartz - Volume diameter Certified value Volume diameter ..... 1400 - 5000 µm	700 g
BCR-165	Latex spheres, nominal 2 µ Average particle diameter ..... 2.223 ± 0.013 µm 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..	vial
BCR-166	Latex spheres, nominal 4.8 µ 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. Average particle diameter ..... 4.821 ± 0.019 µm	vial
BCR-167	Latex spheres, nominal 9.6 µ 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. Average particle diameter ..... 9.475 ± 0.018 µm	vial
	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 (5)

Code	Product	Unit
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-1692	Polystyrene (0.25 wt. % in water) - Particle size Certified value Particle size.....2.982 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	1 slide
NIST-1978	Zirconium oxide - Particle size Certified value Particle size.....0.33 – 2.19 µm	5 g
NIST-1982	Zirconia thermal spray powder - Particle size Certified value Particle size.....10 - 150 µm	10 g

Code	Product	Unit

NIST-1984 — Thermal spray powder - Particle size distribution — 14 g

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.

Certified PSD Values by scanning electron microscopy (SEM)

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

NIST-1985 — Thermal spray powder - Particle size distribution — 14 g

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.

Certified PSD Values by scanning electron microscopy (SEM)

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

NIST-RM 8010 — Sand - Particle size — 3 x 150 g

Reference value

Particle size.....30 - 325 µm

NIST-2806A — Medium test dust (MTD) in hydraulic fluid — 2 x 400 mL

NIST-2806a can be used in conjunction with the International Organization for Standardisation (ISO) method ISO/FDIS 11171, “Hydraulic Fluid Power - Calibration of Liquid Automatic Particle Counters”

Certified values

Particle Concentration (Particles/mL)	Projected Area Diameter (µm)	*u* Sampling (µm)	*u* Volume (µm)	*u* Length (µm)	*u* Digitalization	*u* Fractionation (µm)
108400	1	0.004	0.004	0.0006	0.127	0.051
27035	2	0.006	0.006	0.00003	0.123	0.049
11209	3	0.009	0.010	0.0005	0.122	0.059
6095	4	0.011	0.013	0.002	0.121	0.094
3737	5	0.012	0.015	0.004	0.121	0.167
2395	6	0.016	0.016	0.006	0.131	0.246
1573	7	0.019	0.017	0.009	0.131	0.236
1055	8	0.024	0.018	0.013	0.131	0.210
725.8	9	0.031	0.019	0.017	0.131	0.235
513.7	10	0.041	0.021	0.021	0.131	0.289
374.6	11	0.052	0.023	0.025	0.131	0.351
281.0	12	0.065	0.025	0.029	0.131	0.467
216.4	13	0.081	0.027	0.031	0.131	0.616
170.4	14	0.101	0.030	0.033	0.131	0.810
136.8	15	0.123	0.032	0.033	0.131	1.090
111.3	16	0.146	0.034	0.033	0.131	1.190
91.33	17	0.168	0.035	0.033	0.131	1.439
75.29	18	0.187	0.036	0.034	0.131	1.706
62.17	19	0.204	0.036	0.036	0.131	2.036
51.35	20	0.219	0.036	0.041	0.131	2.509
42.40	21	0.235	0.036	0.047	0.131	2.473
35.01	22	0.255	0.036	0.056	0.131	2.738
28.95	23	0.281	0.037	0.068	0.131	2.953
23.99	24	0.314	0.038	0.081	0.131	3.267
19.95	25	0.356	0.039	0.097	0.131	3.450
16.66	26	0.408	0.040	0.115	0.131	3.603
13.98	27	0.468	0.041	0.135	0.131	3.983
11.80	28	0.539	0.043	0.158	0.131	4.144
10.02	29	0.618	0.045	0.184	0.131	4.247
8.568	30	0.706	0.047	0.212	0.131	4.914

NIST-RM 8632

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.

NIST-RM 8632 — Ultrafine Test Dust — 20 g

Particle size calibration standards from Whitehouse Scientific

Whitehouse Scientific has been producing precision glass microspheres for calibration for 24 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. In addition to calbration, applications include filter testing, space research, nuclear fall-out studies, micro-engineering and precision spacers.

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.

Polydisperse particle standards

Code	Product	Unit
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	1.0 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	1.0 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	1.0 g
WS-PS226	Polydisperse particle standard - Nominal size: 50 - 350 µm	2.5 g
WS-PS227	Polydisperse particle standard - Nominal size: 50 - 350 µm	5.0 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	1.0 g
WS-PS235	Polydisperse particle standard - Nominal size: 150 - 650 µm	2.5 g
WS-PS236	Polydisperse particle standard - Nominal size: 150 - 650 µm	5.0 g
WS-PS237	Polydisperse particle standard - Nominal size: 150 - 650 µm	7.0 g
WS-PS240	Polydisperse particle standard - Nominal size: 500 - 2000 µm	7.0 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

Code	Product	Unit
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
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

Code	Product	Unit
WS-SS391	Sieve standard - For sieve size: 20 µm Mesh..... 635 Calibration range .....18.8 - 23.7 µm	0.8 g
WS-SS392	Sieve standard - For sieve size: 25 µm Mesh..... 500 Calibration range .....21.7 - 30.2 µm	0.8 g
WS-SS393	Sieve standard - For sieve size: 32 µm Mesh..... 450 Calibration range .....27.8 - 34.1 µm	1.0 g
WS-SS394	Sieve standard - For sieve size: 36, 38, 40 µm Mesh..... 400 Calibration range .....33.5 - 41.6 µm	1.0 g
WS-SS395	Sieve standard - For sieve size: 45, 50 µm Mesh..... 325 Calibration range .....42.0 - 50.8 µm	1.0 g
WS-SS396	Sieve standard - For sieve size: 53, 56 µm Mesh..... 270 Calibration range .....48.4 - 59.5 µm	1.0 g
WS-SS397	Sieve standard - For sieve size: 63 µm Mesh..... 230 Calibration range .....56.6 - 70.4 µm	1.0 g
WS-SS398	Sieve standard - For sieve size: 71, 75, 80 µm Mesh..... 200 Calibration range .....67.1 - 82.8 µm	1.0 g
WS-SS399	Sieve standard - For sieve size: 90 µm Mesh..... 170 Calibration range .....78.8 - 97.6 µm	1.0 g
WS-SS400	Sieve standard - For sieve size: 100, 106, 112 µm Mesh..... 140 Calibration range .....91.4 - 117 µm	1.0 g
WS-SS401	Sieve standard - For sieve size: 125 µm Mesh..... 120 Calibration range .....112 - 139 µm	1.0 g
WS-SS402	Sieve standard - For sieve size: 140, 150, 160 µm Mesh..... 100 Calibration range .....134 - 167 µm	2.5 g
WS-SS403	Sieve standard - For sieve size: 180 µm Mesh..... 80 Calibration range .....161 - 199 µm	2.5 g
WS-SS404	Sieve standard - For sieve size: 200, 212, 224 µm Mesh..... 70 Calibration range .....191 - 237 µm	2.5 g
WS-SS405	Sieve standard - For sieve size: 250, 280 µm Mesh..... 60 Calibration range .....226 - 281 µm	2.5 g
WS-SS406	Sieve standard - For sieve size: 300, 315 µm Mesh..... 50 Calibration range .....270 - 333 µm	2.5 g
WS-SS407	Sieve standard - For sieve size: 355 µm Mesh..... 45 Calibration range .....322 - 398 µm	2.5 g
WS-SS408	Sieve standard - For sieve size: 400, 425, 450 µm Mesh..... 40 Calibration range .....377 - 470 µm	2.5 g
WS-SS409	Sieve standard - For sieve size: 500 µm Mesh..... 35 Calibration range .....440 - 557 µm	2.5 g
WS-SS410	Sieve standard - For sieve size: 560, 600, 630 µm Mesh..... 30 Calibration range .....526 - 657 µm	2.5 g
WS-SS411	Sieve standard - For sieve size: 710 µm Mesh..... 25 Calibration range .....658 - 809 µm	2.5 g
WS-SS412	Sieve standard - For sieve size: 800, 850, 900 µm Mesh..... 20 Calibration range .....774 - 951 µm	2.5 g
WS-SS413	Sieve standard - For sieve size: 1000 µm Mesh..... 18 Calibration range .....910 - 1106 µm	7.0 g
WS-SS414	Sieve standard - For sieve size: 1120, 1180, 1250 µm Mesh..... 16 Calibration range .....1091- 1335 µm	10.0 g
WS-SS415	Sieve standard - For sieve size: 1400, 1550 µm Mesh..... 14 Calibration range .....1292 - 1609 µm	15.0 g
WS-SS416	Sieve standard - For sieve size: 1600, 1700, 1800 µm Mesh..... 12 Calibration range .....1515 - 1866 µm	15.0 g
WS-SS417	Sieve standard - For sieve size: 2000 µm Mesh..... 10 Calibration range .....1836 - 2236 µm	20.0 g

Code	Product	Unit
WS-SS418	Sieve standard - For sieve size: 2240, 2360, 2500 µm Mesh ..... 8 Calibration range .....2148 - 2661 µm	20.0 g
WS-SS419	Sieve standard - For sieve size: 2800, 3150 µm Mesh ..... 7 Calibration range .....2555 - 3232 µm	25.0 g
WS-SS420	Sieve standard - For sieve size: 3350, 3550 µm Mesh ..... 6 Calibration range .....3072 - 3783 µm	25.0 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-GP0058	General purpose glass microspheres - Sieve fraction: 53 - 63 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
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-GP1060	General purpose glass microspheres - Sieve fraction: 1000 - 1120 µm	400 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-GP1650	General purpose glass microspheres - Sieve fraction: 1600 - 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-GP2500	General purpose glass microspheres - Sieve fraction: 2300 - 2700 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

Code	Product	Unit
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

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
BAMPM 101	Silica - Specific surface area (BET) Certified values Specific surface area (BET) ..... 0.177 m^2/g	10 g
BAMPM 102	Alpha alumina - Specific surface area (BET) Certified values Specific surface area (BET) ..... 5.41 m^2/g	10 g
BAMPM 103	Alumina type 60 Certified values Specific surface area (BET) ..... 156.0 m^2/g Mean pore radius ..... 3.18 nm Specific pore volume ..... 0.250 cm^3/g	10 g
BAMPM 104	Alumina type 150 Certified values Specific surface area (BET) ..... 79.8 m^2/g Mean pore radius ..... 5.31 nm Specific pore volume ..... 0.210 cm^3/g	10 g

Code	Product	Unit
NIST-1899	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 1000m^2/g. Certified values Specific surface area (BET) multipoint ..... 10.67 m^2/g Specific surface area (BET) single point..... 10.52 m^2/g	4 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
NIST-1917	Alumina - Specific pore volume 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. Certified properties: 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 Certified pore volume values at selected intrusion pressures and certified pore diameter 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 ..... $mm^3 \cdot g^{-1}$ Specific Pore Volume at 395 MPa ..... 638.6 ..... 3.9 ..... 21.6 ..... $mm^3 \cdot g^{-1}$ 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 x - mean of the laboratory means (certified value) U - expanded uncertainty (coverage factor 2) s - standard deviation of the certified value Note: all certified pore volumes are normalized values V'p = Vp(pHg) - Vp(0.1 MPa)	10 g
NIST-1918	Silica-alumina - Specific pore volume 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. Certified values 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

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

Code	Product	Unit
	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-1893	Bright copper - Hardness (Knoop) Load 0.245, 0.490, 0.981N Certified value Hardness (nominal).....125 kg/mm^2	each
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/mm2. 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-1896B	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/mm2. 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/mm2. 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/mm2. 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

Code	Product	Unit
NIST-2831	Vickers Hardness of Ceramics and Hardmetals 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 disk that has a nominal hardness of approximately 15.0 GPa (1530 kgf/mm^2) packaged in a wooden box. Each unit is individually certified and bears a serial number scribed on the opposite (bottom) face of the disk. Vickers hardness is calculated as $HV = \alpha P/d^2$, where P is the indentation load, d is the average diagonal size [(d1 + d2)/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/m^2 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/mm^2 are also included in parenthesis for the convenience of users..	each

Suface roughness

Code	Product	Unit
NIST-2073a	Electroless-nickel coated steel This Standard Reference Material® is certified for roughness average R_a and surface spatial wavelengh, D, and is intended for use as a standard for the calibration of stylus instruments that are used to measure surface roughness. 2.4 cm x 3.3 cm Certified values Roughness average R_a ..... 3.0 µm Wavelength D..... 99.099 µm	each
NIST-2074	Electroless-nickel coated steel This Standard Reference Material® is certified for roughness average R_a and surface spatial wavelengh, D, and is intended for use as a standard for the calibration of stylus instruments that are used to measure surface roughness. 2.4 cm x 3.3 cm Certified values Roughness average R_a ..... 1.0 µm Wavelength D..... 40 µm	each
NIST-2075	Electroless-nickel coated steel This Standard Reference Material® is certified for roughness average R_a and surface spatial wavelengh, D, and is intended for use as a standard for the calibration of stylus instruments that are used to measure surface roughness. 2.4 cm x 3.3 cm Certified values Roughness average R_a ..... 1.0 µm Wavelength D..... 800 µm	each
NIST-RM 8457	Ultra high molecular weight polyethylene 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 polyetheylene (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. Reference values Cube dimension — Dimension (cm) — Surface roughness (µm) Faces normal to bar direction ..... 0.4919 ± 0.005 ..... 5.5 ± 0.6 Faces perpendicular to bar direction ..... 0.5017 ± 0.006	10 cubes

Surface tension

GUM 11.1 - GUM 11.3

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/m^3 . Decimal values are given in the certificate.

Code	Product	Unit
GUM 11.1	Isooctane Certified value Surface tension ..... 18 mN/m at 20 ºC	30 mL
GUM 11.2	Benzene Certified value Surface tension ..... 28 mN/m at 20 ºC	30 mL
GUM 11.3	Glycerol Certified value Surface tension ..... 63 mN/m at 20 ºC	30 mL

Depth profiling

Code	Product	Unit
BCR-261T	Tantalum pentoxide on tantalum foil 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	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
NIST-2135C	Nickel-chromium thin film - Depth profile Intended for calibrating equipment used to measure sputtered depth and erosion rates in surface analysis. Total thickness Certified values Cr .....206.3 µg/cm^2 Ni ..... 197.4 µg/cm^2 Single layer thickness Certified values Cr .....41.3 µg/cm^2 Ni ..... 49.4 µg/cm^2	each
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.....1.018×10^{15} atoms/cm^2	each

Coatings

NIST-1359b - 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-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

Optical properties

Molecular absorption and luminescence

Code	Product	Unit
ERM-FB011	UV-Visible absorbance standard - Sodium nitrate/cobalt chloride/nickel chloride solution This certified reference material is intended for use in the verification and calibration of the absorbance scales of ultraviolet-visible absorption spectrometers. Certified values 3 standard + 1 blank UV-visible absorbance at four wavelengths (299.4, 395.0, 512.5 and 719.0 nm) at a 1 nm bandwidth.	cuv. (4)
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-930E	Glass filters Visible transmittance at 5 wavelengths (440.0, 465.0, 546.1 590.0 and 635.0 nm).	set
NIST-931G	Liquid filters UV-visible absorbance at 4 wavelengths (302, 395, 512 and 678 nm). Liquid Filter — 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	set (12)
NIST-935A	Potassium dichromate UV absorbance at 5 wavelengths (235, 257, 313, 345, and 350 nm).	15 g
NIST-936A	Quinine sulphate dihydrate For use in the evaluation of methods and the calibration of fluorescence spectrometers. Certified for the relative molecular emission spectrum, E (l), in radiometric units for a solution of 1.28 x 10^{-6} mol/L quinine sulphate dihydrate in 0.105 mol/L perchloric acid using an excitation wavelength of 347.5 nm. The values of the molecular emission spectrum are certified at 5 nm wavelength intervals from 375 nm to 675 nm.	1 g
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 terephtalate) 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 192lb 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.	1 card
NIST-2032	Heterochromatic stray radiation energy standard for UV Spectrophotometry Potassium iodide for use in the assessment of heterochromatic stray radiation energy (stray light) below 260 nm UV absorbance at 8 wavelengths (240, 245, 250, 255, 260, 265, 270 and 275 nm).	25 g
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.	1 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 λ_{EM} = 450 nm to 650 nm at 1 nm wavelength intervals at a fixed excitation wavelength (λ_{EX}) of 427 nm.	Cuv (1)
NIST-2035	Near infrared transmission wavelength standard Glass filter certified for the location of the centre of gravity of 7 absorbance bands in the range 10,300 to 5130 cm^{-1}, at 6 bandwidths from 4 to 128 cm^{-1}.	1 filter
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).	1 filter
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} resultion. 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 ($^{12}C_2H_2$) 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.	1 cell
NIST-2241	Relative intensity correction standard for Raman spectroscopy 785 nm excitation NIST-2241 is a chromium-doped (0.02 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 × 30.4 mm in length × 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 °C to 25 °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
NIST-2242	Relative Intensity Correction Standard for Raman Spectroscopy 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.	each
NIST-2243	Relative Intensity Correction Standard for Raman Spectroscopy 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.	each

Starna optical reference materials

Starna® optical reference materials produced by Optiglass are now available from LGC Promochem. Optiglass 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.

Code	Product	Unit
STRM-0204060810	Potassium dichromate - UV absorbance and linearity 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.	set
STRM-0204060810-R	Recertification: Potassium dichromate - UV absorbance and linearity	set
STRM-02040608	Potassium dichromate - UV absorbance and linearity 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.	set
STRM-02040608-R	Recertification: Potassium dichromate - UV absorbance and linearity	set
STRM-020406	Potassium dichromate - UV absorbance and linearity 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.	set
STRM-020406-R	Recertification: Potassium dichromate - UV absorbance and linearity	set
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 from 0.1% to 90%.

Code	Product	Unit
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

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	Holmium oxide - UV and visible wavelength 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. 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.	1 cell
STRM-HL-R	Recertification: Holmium oxide - UV and visible wavelength	1 cell
STRM-DL	Didymium (neodymium & praesodymium) - UV and visible wavelength Description: Didymium (neodymium praesodymium) 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. 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.	1 cell
STRM-DL-R	Recertification: Didymium (neodymium & praesodymium) - UV and visible wavelength	1 cell
STRM-SL	Samarium - UV and visible wavelength 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. 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.	1 cell
STRM-SL-R	Recertification: Samarium - UV and visible wavelength	1 cell

Code	Product	Unit
STRM-HG	Holmium glass filter - UV and visible wavelength 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. 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.	1 filter
STRM-HG-R	Recertification: Holmium glass filter - UV and visible wavelength	1 filter
STRM-DG	Didymium glass - UV wavelength 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. 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.	1 filter
STRM-DG-R	Recertification: Didymium glass - UV wavelength	1 filter

Far UV wavelength

STRM-RE	Rare earth - UV and visible wavelength 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. 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.	1 cell
STRM-RE-R	Recertification: Rare earth - UV and visible wavelength	1 cell

Stray light

Inorganic cut-off filters – UV stray light

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.

Description: Materials with sharp cut-offs in transmission at specified wavelengths.

Primary usage: Detection of stray light in the UV region.

Useable range: 200 nm to 260 nm, depending on the material.

Physical configuration: Far UV quartz cells that have been permanently heat sealed.

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)	1 cell

Resolution

Code	Product	Unit
	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.	
STRM-TX	Toluene in hexane - resolution Description: 0.020% v/v solution of toluene in hexane. Primary usage: Determination of spectral bandwidth in the UV region. Useable range: 265 nm to 270 nm, instruments with a spectral bandwidth of less than 3 nm. Physical configuration: Far UV quartz cells that have been permanently sealed. 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. Ratio 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
STRM-TX-R	Recertification: Toluene in hexane - resolution	set
STRM-BZ	Benzene vapour Description: 0.1 mL benzene in the vapour state. Primary usage: Determination of spectral bandwidth in the UV region. Useable range: 230 nm to 270 nm, instruments with a spectral bandwidth of less than 1 nm. Physical configuration: Far UV quartz cells that have been permanently heat sealed. 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.	1 cell
STRM-BZ-R	Recertification: Benzene vapour	1 cell

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 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.	set
STRM-06HL-R	Recertification: STRM-06 + STRM-HL	set
STRM-06DLKI	STRM-06 + STRM-DL + STRM-KI 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 & praesodymium) - UV and visible wavelength Didymium (neodymium praesodymium) 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)	set
STRM-06DLKI-R	Recertification: STRM-06 + STRM-DL + STRM-KI	set
STRM-06HLKI	STRM-06 + STRM-HL + STRM-KI 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)	set
STRM-06HLKI-R	Recertification: STRM-06 + STRM-HL + STRM-KI	set

Code	Product		Unit
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
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

Optical properties

Code	Product	Unit
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
STRM-0660HLKCSITX	UV and visible instrument spec. kit	set
	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)	
STRM-0660HLKCSITX-R	Recertification: UV and visible instrument spec. kit	set
STRM-06HLKCTX	Pharmacopoeia kit	set
	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)	
STRM-06HLKCTX-R	Recertification: Pharmacopoeia kit	set

Code	Product	Unit
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-0660HLKCTX	E.P. 5.2 Pharmacopoeia kit Each set consists on 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
STRM-020610HLKCTX-R	Recertification: Single Box 3-point linearity full spec. kit (9 cells)	set

Refractive index

ERM-BD011	Orange juice 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	3 mL
ERM-BD012	Orange juice 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	3 mL
ERM-BD013	Orange juice 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	3 mL
ERM-BD014	Orange juice 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	3 mL

Optical properties

Code	Product	Unit
ERM-BD015	Orange juice 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	3 mL
NIST-1822A	Refractive index standard 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 546.2260 ..... 1.521629 ± 0.000016 587.7254 ..... 1.519535 ± 0.000016 644.0250 ..... 1.517277 ± 0.000016	plate
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 7.9 This group of 11 liquid reference materials, produced by LGC Promochem 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 1.702 (1-Iodonaphthalene). The *n* 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 λ = 589.3 nm, t = 20°C and associated uncertainties are given. Reference liquids are packed in glass ampoules (7.1, 7.2, 7.5, 7.6, 7.8, 7.9) or plastic drop-bottles (7.11, 7.12, 7.13, 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 7.13	Silicone oil AN 140 Refractive index ..... 1.560 at 20°C	10 mL
PRG 7.8	1-Bromonaphthalene Refractive index ..... 1.657 at 20 °C	10 mL
PRG 7.9	1-Iodonaphthalene Refractive index ..... 1.702 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)	1 x 7 mL

Code	Product	Unit
RPC1806Y	Refractive index liquid Any individual standard Refractive index range: 1.400-1.458 (interval 0.002)	1 x 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)	1 x 7 mL
RPC1809Y	Refractive index liquid Any individual standard* Refractive index range: 1.460-1.640 (interval 0.002)	1 x 30 mL
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)	1 x 7 mL
RPC1812Y	Refractive index liquid Any individual standard* Refractive index range: 1.642-1.700 (interval 0.002)	1 x 30 mL
	*For individual standards please state in brackets after the catalogue number the refractive index required.	

Optical rotation

GUM 8.1	Sucrose (Saccharose) Certified values Optical rotation at 20 ºC 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. Nominal Hunter values: L 26, a 33, b 14.5	tile
	BCR-406A and BCR-406B 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.	
BCR-406A	Opal glass 50 mmD x 14 mm thick	disc

Ion activity

Code	Product	Unit
BCR-406B	Opal glass 100 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 (5)
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 Nicon 5i.	each
NIST-2059	Photomask linewidth calibration standard NIST-2059 is an antireflecting etched chrome binary photomask on a nominal 152.4 mm x 152.4 mm x 6.35 mm (the industry standard 6.0 in. x 6.0 in. x 0.25 in.) quartz substrate. It consists of patterns of clear and opaque isolated lines with nominal dimensions ranging from 0.25 µm to 32 µm and linespacing (pitch) patterns ranging from 0.5 µm to 250 µm. Each mask is individually calibrated, with certified values given for isolated linewidths (both clear and opaque) and center-to-center line spacings for one of the eight repeated patterns on the SRM. All measurements are averaged over the central 2 µm of each feature to reduce the influence of line edge roughness. The certified values are traceable to the definition of the meter with an expanded (k=2) uncertainty less than 25 nm for linewidths and spacewidths and less than 9 nm for pitch. Other small objects of interest, such as features on IC wafers, magnetic read/write head gaps, biological materials, phase shift photomasks, etc., will image differently in a microscope. Consequently, this SRM is intended for measurements on binary photomasks only, which represent more than 85 % of all photomasks manufactured worldwide in the most recent survey,	each

Microscopy

NIST-2800	Microscope magnification standard This Standard Reference Material© (SRM®) is intended primarily for use in calibrating the magnification or scale of microscopes used to make dimensional measurements. These microscopes include optical and scanning electron microscopes, imaging in either transmission or reflection modes, and scanning probe microscopes. NIST-2800 consists of a pattern of parallel lines whose nominal distances from the centerline range from ± 1 µm to ± 5 mm (see Figure 1). Certified values are given for the centre-to-centre distance of each line from the centreline; the linewidths are not certified. The pattern is printed in chrome on a fused-quartz substrate with nominal dimensions of 25 mm × 75 mm × 2.3 mm (1 in × 3 in × 0.09 in) using photomask production techniques.	each
NIST-1867	Uncommon commercial asbestos This Standard Reference Material (SRM®) comprises three uncommon commercial asbestos materials (tremolite, actinolite asbestos, and anthophyllte asbestos) intended for use in the identification of these minerals by polarised light microscopy (PLM).	set (3)
NIST-1866B	Common commercial asbestos This standard reference material (SRM®) is comprised of three commercial-grade asbestos materials: chrysotile, asbestiform grunerite (amosite), and asbestiform riebeckite (crocidolite). These are the types of asbestos that were, or are, commonly used in commerce. These asbestos materials are typical of the asbestos found in bulk samples during routine asbestos inspections of building materials. The optical properties of these materials have been characterized so that this SRM may serve as a primary calibration standard in the identification of asbestos with polarized light microscopy (PLM). However, various conditions, such as geographic origin or acid/heat treatment of the asbestos, could cause the optical properties of the asbestos in bulk insulation samples to vary considerably from the materials comprising this SRM. A unit of NIST-1866b consists of a set of three bottles: one bottle containing chrysotile, one bottle containing asbestiform grunerite (amosite), and one bottle containing asbestiform riebeckite (crocidolite). Each bottle contains between 1 gram and 3 grams of material.	set (3)

Ion activity

pH calibration

Code	Product	Unit
NIST-185h	Potassium hydrogen phthalate This Standard Reference Material (SRM) is intended for use in preparing solutions for calibrating electrodes for pH measuring systems. Certified value pH (25 °C) .....4.003 Certified values of the pH at other temperatures are given in the CoA.	60 g
NIST-186G	pH Standards Potassium dihydrogen phosphate (186Ig) Disodium hydrogen phosphate (186IIg) NIST-186g is intended for use in preparing solutions for calibrating electrodes for pH measuring systems. NIST-186 g consists of two components, each prepared to ensure high purity and uniformity: KH_2PO_4, potassium dihydrogen phosphate (186-I-g) and Na_2HPO_4, disodium hydrogen phosphate (186-II-g). A unit of NIST-186g consists of 30 g of potassium dihydrogen phosphate (186-I-g) and 45 g of disodium hydrogen phosphate (186-II-g), each contained in its respective clear glass bottle.	set

Code	Product	Unit
NIST-187E	Sodium tetraborate decahydrate (Borax) This Standard Reference Material (SRM) is intended for use in preparing solutions for calibrating electrodes for pH measuring systems.	30 g
NIST-2193A	Calcium carbonate pH standard This Standard Reference Material® (SRM®) is intended for use in preparing solutions for calibrating electrodes for pH measuring systems at pH values above 11.0. This lot of calcium carbonate ($CaCO_3$) was selected for its low level of alkali metal impurities. However, this SRM® is certified ONLY as a pH standard, NOT as a pure substance. Before use for pH calibrations, a freshly filtered, saturated (at 25 °C) solution of $Ca(OH)_2$ must be prepared from NIST-2193a. The certified pH(S) and U of this solution as a function of temperature are given below.	30 g

t/°C	pH(S)	u_c(measurement)	$u_c(y)$	*k*	*U*
5	13.232	0.0030	0.0058	2.0	0.011
10	13.026	0.0025	0.0056	2.0	0.011
15	12.830	0.0025	0.0056	2.0	0.011
20	12.645	0.0024	0.0056	2.0	0.011
25	12.469	0.0024	0.0055	2.0	0.011
30	12.303	0.0071	0.0087	2.0	0.017
35	12.145	0.0071	0.0087	2.0	0.017
37	12.084	0.0071	0.0087	2.0	0.017
40	11.995	0.0071	0.0087	2.0	0.017
45	11.853	0.0072	0.0087	2.0	0.017
50	11.717	0.0074	0.0089	2.0	0.017

NIST-188	Potassium hydrogen tartrate Certified value pH (25 °C) ..... 3.557 Other certified values of pH at different temperatures are given in the CoA.	60 g
NIST-191C	pH Standards (Carbonate buffers; sodium bicarbonate and sodium carbonate) This Standard Reference Material® (SRM®) is intended for use in preparing solutions for calibrating electrodes for pH measuring systems. NIST-191c consists of two components, each prepared to ensure high purity and uniformity: Sodium bicarbonate, $NaHCO_3$ (191-I-c) and sodium carbonate, Na_2CO_3 (191-II-c).A unit of NIST-191c consists of 25 g of sodium bicarbonate (191-I-c) and 30 grams of sodium carbonate (191-II-c), each contained in its respective clear glass bottle. Certified value pH (25 °C) ..... 10.012 Certified values of pH at 15 °C, 20 °C and 35 °C are given in the CoA.	25 g
NIST-RM 8040	Sodium oxalate (Reductometric) This Reference Material (RM) was prepared to provide material of uniform, high purity for use as a working standard for oxidation-reduction reactions. The material conforms to the American Chemical Society specification for reagent-grade material, but should not be considered as entirely free from impurities such as moisture, sodium hydrogen oxalate and sodium hydrogen carbonate. A unit of RM 8040 consists of one bottle containing 60 g of crystalline sodium oxalate. Reference value Reductometric Assay (mass fraction): 99.951 % ± 0.038 %	60 g

Biological buffer systems

NIST-2182 - NIST-2184

These materials are intended for use in calibrating clinical instruments (e.g. blood pH measurements), in the physiologically important range of pH 7-8. They are based on a biological buffer system for clinical pH measurements and are certified for use as an admixture only. The pH values for the buffer solutions are certified at 0.05 and 0.08 M with respect to the free acid and the sodium salt admixture as a function of temperature. The certified temperature range is from 0-50 °C.

NIST-2181 and NIST-2182

Both materials are required to prepare a standard solution.

NIST-2181	HEPES free acid Certified values 0.05M pH (0-50 °C) ..... 7.832-7.216 0.08M pH (0-50 °C) 7.853-7.222	60 g
NIST-2182	HEPES Sodium Salt Certified values 0.05M pH (0-50 °C) ..... 7.832-7.216 0.08M pH (0-50 °C) 7.853-7.222	60 g

Ion activity

Code	Product	Unit
	NIST-2183 and NIST-2184 Both materials are required to prepare a standard solution.	
NIST-2183	MOPSO free acid Certified values 0.05M pH (0-50 °C).....7.260-6.528 0.08M pH (0-50 °C).....7.268-6.528	50 g
NIST-2184	NaMOPSOate Certified values 0.05M pH (0-50 °C).....7.260-6.528 0.08M pH (0-50 °C).....7.268-6.524	50 g

pD calibration

NIST-2185	Potassium hydrogen phthalate Certified value pD (25 °C).....4.518	60 g
NIST-2186II	Disodium Hydrogen Phosphate Required to prepare a standard solution. Certified value pD (25 °C).....7.428 Other certified values at different temperatures are given in the CoA.	30 g
NIST-2191A	Sodium bicarbonate Required to prepare a standard solution. Certified value pD (25 °C).....10.73 Other certified values at different temperatures are given in the CoA.	30 g
NIST-2192A	Sodium carbonate Required to prepare a standard solution. Certified value pD (25 °C).....10.732 Other certified values at different temperatures are given in the CoA.	30 g

Ion-selective electrode calibration

NIST-2201	Sodium chloride Certified values for activity coefficients, at 25°C, of the sodium and chloride ions at various concentrations and the related values of pNa and pCl.	125 g
NIST-2202	Potassium chloride Certified values for activity coefficients, at 25°C, of the potassium and chloride ions at various concentrations and the related values of pK and pCl.	160 g
NIST-2203	Potassium fluoride Certified values for activity coefficients, at 25°C, of the potassium and fluoride ions at various concentrations and the related value of pF.	125 g

Electrolytic conductivity

NIST-3199	KCl in n-propanol/de-ionised water Certified value Electrolytic conductivity (25 °C).....15.36 µS/cm	500 mL
NIST-3192	KCl in de-ionised water Certified value Electrolytic conductivity (25 °C).....496.73 µS/cm	8 x 50 mL
NIST-3193	KCl in de-ionised water Certified value Electrolytic conductivity (25°C).....996.70 µS/cm	8 x 50 mL

Code	Product	Unit
	GUM 5.2 - GUM 5.6 These Reference Materials below, have been certified by the Physical Chemistry Division of the Central Office of Measures in Poland. They are intended for calibration of conductivity cells or use in electrolytic conductivity measurement as a control sample. These RMs are certified in conformity with standard reference data published by the International Organisation of Legal Metrology (OIML). All Reference Materials are supplied with a certificate.	
GUM 5.1	KCl solution Certified value Electrolytic conductivity.....11.13 S/m at 25 ºC	100 mL
GUM 5.2	KCl Solution Certified value Electrolytic conductivity.....1.285 S/m at 25 ºC	100 mL
GUM 5.3	KCl solution Certified value Electrolytic conductivity.....0.1410 S/m at 25 ºC	100 mL
GUM 5.4	KCl solution Certified value Electrolytic conductivity..... 0.01483 S/m at 25 °C	100 mL
GUM 5.5	KCl solution Certified value Electrolytic conductivity.....0.0720 S/m 25 °C	100 mL
GUM 5.6	KCl solution Certified value Electrolytic conductivity.....0.0293 S/m at 25 ºC	100 mL

Reagecon electrolytic conductivity standards

Standard values

REACSKC84	Conductivity standard Electrolytic conductivity.....84 µS/cm at 25°C	500 mL
REACSKCS	Conductivity standard Electrolytic conductivity.....147 µS/cm at 25°C	500 mL
REACSKCL	Conductivity standard Electrolytic conductivity.....1413 µS/cm at 25°C	500 mL
REACSKC12880	Conductivity standard Electrolytic conductivity.....12880 µS/cm at 25°C	500 mL
REACSKC13	Conductivity standard Electrolytic conductivity.....1.30 µS/cm at 25°C	250 mL
REACSKC136	Conductivity standard Electrolytic conductivity.....1.30 µS/cm at 25°C	6 x 250 mL
REACSKC5	Conductivity standard Electrolytic conductivity.....5 µS/cm at 25°C	500 mL
REACSKC10	Conductivity standard Electrolytic conductivity.....10 µS/cm at 25°C	500 mL
REACSKC20	Conductivity standard Electrolytic conductivity.....20 µS/cm at 25°C	500 mL
REACSKC50	Conductivity standard Electrolytic conductivity.....50 µS/cm at 25°C	500 mL
REACSKC100	Conductivity standard Electrolytic conductivity.....100 µS/cm at 25°C	500 mL
REACSKC200	Conductivity standard Electrolytic conductivity.....200 µS/cm at 25°C	500 mL
REACSKC500	Conductivity standard Electrolytic conductivity.....500 µS/cm at 25°C	500 mL
REACSKC1000	Conductivity standard Electrolytic conductivity.....1000 µS/cm at 25°C	500 mL
REACSKC5M	Conductivity standard Electrolytic conductivity.....5000 µS/cm at 25°C	500 mL

Electrical properties

Code	Product	Unit
REACSKC10M	Conductivity standard Electrolytic conductivity .....10000 µS/cm at 25°C	500 mL
REACSKC20M	Conductivity standard Electrolytic conductivity .....20000 µS/cm at 25°C	500 mL
REACSKC50M	Conductivity standard Electrolytic conductivity .....50000 µS/cm at 25°C	500 mL
REACSKC100M	Conductivity standard Electrolytic conductivity .....100000 µS/cm at 25°C	500 mL
REACSKC150M	Conductivity standard Electrolytic conductivity .....150000 µS/cm at 25°C	500 mL
REACSKC200M	Conductivity standard Electrolytic conductivity .....200000 µS/cm at 25°C	500 mL
REACSKC300M	Conductivity standard Electrolytic conductivity .....300000 µS/cm at 25°C	500 mL
REACSKC350M	Conductivity standard Electrolytic conductivity .....350.000 µS/cm at 25°C	500 mL
REACSKC450M	Conductivity standard Electrolytic conductivity .....450000 µS/cm at 25°C	500 mL
REACSKC500M	Conductivity standard Electrolytic conductivity .....500000 µS/cm at 25°C	500 mL

Conductivity standards according to the European Pharmacopoeia (Chapter 2)

REAEP1330	Conductivity standard Electrolytic conductivity .....1330 µS/cm at 20°C Resistivity .....752 Ω·cm	500 mL
REAEP133	Conductivity standard Electrolytic conductivity .....133 µS/cm at 20°C Resistivity .....7519 Ω·cm	500 mL
REAEP266	Conductivity standard Electrolytic conductivity .....26.6 µS/cm at 20°C Resistivity .....37594 Ω·cm	500 mL

Electrical properties

Electrical resistivity and conductivity

Code	Product	Unit
NIST-624	Lead-silica - dc Resistivity Intended for checking test methods and for calibrating equipment used to determine the dc volume resistivity of glass per ASTM C 657. Certified value: Resistivity Temperature $log_{10}\rho$ 11.07 Ω·cm .....250°C $log_{10}\rho$ 9.9Ω·cm .....300°C $log_{10}\rho$ 8.88 Ω·cm .....350°C	200 g
	NIST-2541 - NIST-2547 Single wafers intended for use as reference standards for sheet resistance and resistivity measurements utilising the four-point probe method.	
NIST-2541	Silicon chip - Resistivity 100 mm (D) x 0.625 mm Czochralski-grown, boron-doped silicon wafer with (100) crystallographic orientation. Certified value Resistivity .....0.1 Ω-cm	1 wafer
NIST-2546	Silicon chip - Resistivity 100 mm (D) x 0.625 mm Float zone silicon with (111) orientation and phosphorus-doped by the neutron transmutation doping process. Certified value Resistivity .....100 Ω-cm	1 wafer

Code	Product	Unit
NIST-2547	Silicon chip - Resistivity 100 mm (D) x 0.625 mm Float zone silicon with (111) orientation and phosphorus-doped by the neutron transmutation doping process. Certified value Resistivity ..... 200 Ω-cm	1 wafer
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)	1 rod

Superconducting critical current

NIST-1457	Niobium-titanium wire - Critical current 8.7 cm diameter spool Intended for checking the performance of measurement systems used in superconductor technology. It consists of 2.2 m of a multifilamentary niobium titanium, copper-stabilised superconducting wire wound in a single layer onto a spool with a core diameter of 8.7 cm. Certified values for critical current at 4.2 k and 0.2 μV/cm	each

Dielectric constant

NIST-774	Lead-silica - Dielectric constant 5 cm x 5 cm x 2.5 cm Intended for checking methods used to determine dielectric constant and ac loss characteristics of insulating materials per ASTM D 150. Certified value: K ~7.47 at 100 Hz	each

Viscosity

Viscosity of glass

Code	Product	Unit
	NIST-717a Intended for checking the performance of high temperature viscosity equipment (rotating cylinders) and low temperature viscosity equipment (fibre elongation, beam bending, parallel plates, etc).	
NIST-717A	Borosilicate Certified log_{10} viscosity values (1.00-4.50) versus temperature (1555-880 °C) Indicative values for softening point, annealing point, strain point	450 g

Viscosity fixpoints

	NIST-709 - NIST-717a Intended for calibration of equipment for the determination of the softening, annealing and strain points of glass.	
NIST-709	Extra dense lead Certified values Softening point ..... 384 °C Annealing point ..... 328 °C Strain point ..... 311 °C	500 g
NIST-713	Dense barium crown glass 620/603 Certified values Softening point ..... 738 °C Annealing point ..... 631 °C Strain point ..... 599 °C	225 g
NIST-714	Alkaline earth alumina silicate Certified values Softening point ..... 908 °C Annealing point ..... 710 °C Strain point ..... 662 °C	225 g
NIST-716	Neutral glass Certified values Softening point ..... 794 °C Annealing point ..... 574 °C Strain point ..... 530 °C	225 g
NIST-717A	Borosilicate Certified log_{10} viscosity values (1.00-4.50) versus temperature (1555-880 °C) Indicative values for softening point, annealing point, strain point	450 g

Viscosity oil standards

Code	Product				Unit
	PSL2700V01 - PSL2700V19 These standards are calibrated by the PSL Calibration Accredited Laboratory No. 0247 to ISO 17025. The Standards will be supplied complete with UKAS calibration certificates and have direct traceability to NIST and other international laboratories. Uncertainties of measurement are stated on the calibration certificates. Long shelf lives are provided by using stable base oils.The viscosity oil standards are suitable for the calibration and verification of the following: - Glass Capillary viscometers - Automated Kinematic Viscometer Systems - Rotational/Cone & Plate Viscometers - Low Temperature Viscometer Systems - Cold Cranking Simulators - Flow Cups				
PSL2700V01	N4 - Viscosity oil standard				500 mL
	Kinematic viscosity (nominal)				
	0.47 mm^2/s,cSt (20 °C)	0.45 mm^2/s,cSt (25 °C)	0.40 mm^2/s,cSt (40 °C)		
	Dynamic viscosity (nominal)				
	0.31 mPa.s,cP (20 °C)	0.29 mPa.s,cP (25 °C)	0.26 mPa.s,cP (40°C)		
PSL2700V02	N8 - Viscosity oil standard				500 mL
	Kinematic viscosity (nominal)				
	1. mm^2/s,cSt (20 °C)	0.89 mm^2/s,cSt (25 °C)	0.75 mm^2/s,cSt (40 °C)		
	Dynamic viscosity (nominal)				
	0.77 mPa.s,cP (20 °C)	0.72 mPa.s,cP (25 °C)	0.56 mPa.s,cP (40 °C)		
PSL2700V03	N1.0 - Viscosity oil standard				500 mL
	Kinematic viscosity (nominal)				
	1.3 mm^2/s,cSt (20 °C)	1.2 mm^2/s,cSt (25 °C)	0.97 mm^2/s,cSt (40 °C)		
	Dynamic viscosity (nominal)				
	1.0 mPa.s,cP (20 °C)	0.93 mPa.s,cP (25 °C)	0.76 mPa.s,cP (40 °C)		
PSLN2	N2 - Viscosity oil standard				500 mL
	Kinematic viscosity (nominal)				
	2.9 mm^2/s,cSt (20 °C)	2.6 mm^2/s,cSt (25 °C)	2.0 mm^2/s,cSt (40 °C)	1.7 mm^2/s,cSt (50 °C)	
	Dynamic viscosity (nominal)				
	2.2 mPa.s,cP (20 °C)	2.0 mPa.s,cP (25 °C)	1.5 mPa.s,cP (40 °C)	1.3 mPa.s,cP (50 °C)	
PSL2700V04	S3 - Viscosity oil standard				500 mL
	Kinematic viscosity (nominal)				
	5.0 mm^2/s,cSt (20 °C) 4.4 mm^2/s,cSt (25 °C)	2.9 mm^2/s,cSt (40 °C) 2.6 mm^2/s,cSt (50 °C)	1.3 mm^2/s,cSt (100 °C)		
	Dynamic viscosity (nominal)				
	4.1 mPa.s,cP (20 °C) 3.6 mPa.s,cP (25 °C)	2.4 mPa.s,cP (40 °C) 2.1 mPa.s,cP (50 °C)	0.98 mPa.s,cP (100 °C)		
PSL2700V05	S6 - Viscosity oil standard				500 mL
	Kinematic viscosity (nominal)				
	11 mm^2/s,cSt (20 °C) 8.9 mm^2/s,cSt (25 °C)	5.7 mm^2/s,cSt (40 °C) 4.6 mm^2/s,cSt (50 °C)	1.9 mm^2/s,cSt (100 °C)		
	Dynamic viscosity (nominal)				
	8.8 mPa.s,cP (20 °C) 7.4 mPa.s,cP (25 °C)	4.8 mPa.s,cP (40 °C) 3.7 mPa.s,cP (50 °C)	1.5 mPa.s,cP (100 °C)		
PSL2700V06	N10 - Viscosity oil standard				500 mL
	Kinematic viscosity (nominal)				
	21 mm^2/s,cSt (20 °C) 17 mm^2/s,cSt (25 °C)	10 mm^2/s,cSt (40 °C) 7.5 mm^2/s,cSt (50 °C)	2.7 mm^2/s,cSt (100 °C)		
	Dynamic viscosity (nominal)				
	17 mPa.s,cP (20 °C) 14 mPa.s,cP (25 °C)	9.0 mPa.s,cP (40 °C) 6.2 mPa.s,cP (50 °C)	2.1 mPa.s,cP (100 °C)		
PSL2700V07	S20 - Viscosity oil standard				500 mL
	Kinematic viscosity (nominal)				
	47 mm^2/s,cSt (20 °C) 37 mm^2/s,cSt (25 °C)	18 mm^2/s,cSt (40 °C) 13 mm^2/s,cSt (50 °C)	4.0 mm^2/s,cSt (100 °C)		
	Dynamic viscosity (nominal)				
	40 mPa.s,cP (20 °C) 31 mPa.s,cP (25 °C)	16 mPa.s,cP (40 °C) 11 mPa.s,cP (50 °C)	3.2 mPa.s,cP (100 °C)		

Code	Product			Unit
PSL2700V08	N35 - Viscosity oil standard			500 mL
	Kinematic viscosity (nominal)			
	95 mm^2/s,cSt (20 °C)	32 mm^2/s,cSt (40 °C)	5.8 mm^2/s,cSt (100 °C)	
	72 mm^2/s,cSt (25 °C)	23 mm^2/s,cSt (50 °C)		
	Dynamic viscosity (nominal)			
	82 mPa.s,cP (20 °C)	27 mPa.s,cP (40 °C)	4.7 mPa.s,cP (100 °C)	
	62 mPa.s,cP (25 °C)	19 mPa.s,cP (50 °C)		
PSL2700V09	S60 - Viscosity oil standard			500 mL
	Kinematic viscosity (nominal)			
	160 mm^2/s,cSt (20 °C)	54 mm^2/s,cSt (40 °C)	7.7 mm^2/s,cSt (100 °C)	
	120 mm^2/s,cSt (25 °C)	35 mm^2/s,cSt (50 °C)		
	Dynamic viscosity (nominal)			
	140 mPa.s,cP (20 °C)	47 mPa.s,cP (40 °C)	6.3 mPa.s,cP (100 °C)	
	104 mPa.s,cP (25 °C)	30 mPa.s,cP (50 °C)		
PSL2700V10	N100 - Viscosity oil standard			500 mL
	Kinematic viscosity (nominal)			
	320 mm^2/s,cSt (20 °C)	97 mm^2/s,cSt (40 °C)	11.0 mm^2/s,cSt (100 °C)	
	230 mm^2/s,cSt (25 °C)	59 mm^2/s,cSt (50 °C)		
	Dynamic viscosity (nominal)			
	280 mPa.s,cP (20 °C)	84 mPa.s,cP (40 °C)	9.1 mPa.s,cP (100 °C)	
	200 mPa.s,cP (25 °C)	51 mPa.s,cP (50 °C)		
PSLN140	N140 - Viscosity oil standard			500 mL
	Kinematic viscosity (nominal)			
	400 mm^2/s,cSt (20 °C)	140 mm^2/s,cSt (40 °C)	18.0 mm^2/s,cSt (100 °C)	
	300 mm^2/s,cSt (25 °C)	90 mm^2/s,cSt (50 °C)		
	Dynamic viscosity (nominal)			
	350 mPa.s,cP (20 °C)	120 mPa.s,cP (40 °C)	15.0 mPa.s,cP (100 °C)	
	260 mPa.s,cP (25 °C)	77 mPa.s,cP (50 °C)		
PSL2700V11	S200 - Viscosity oil standard			500 mL
	Kinematic viscosity (nominal)			
	660 mm^2/s,cSt (20 °C)	180 mm^2/s,cSt (40 °C)	17 mm^2/s,cSt (100 °C)	
	460 mm^2/s,cSt (25 °C)	110 mm^2/s,cSt (50 °C)		
	Dynamic viscosity (nominal)			
	590 mPa.s,cP (20 °C)	150 mPa.s,cP (40 °C)	14 mPa.s,cP (100 °C)	
	410 mPa.s,cP (25 °C)	91 mPa.s,cP (50 °C)		
PSLN230	N230 - Viscosity oil standard			500 mL
	Kinematic viscosity (nominal)			
	860 mm^2/s,cSt (20 °C)	230 mm^2/s,cSt (40 °C)	21 mm^2/s,cSt (100 °C)	
	600 mm^2/s,cSt (25 °C)	145 mm^2/s,cSt (50 °C)		
	Dynamic viscosity (nominal)			
	770 mPa.s,cP (20 °C)	190 mPa.s,cP (40 °C)	17.0 mPa.s,cP (100 °C)	
	535 mPa.s,cP (25 °C)	120 mPa.s,cP (50 °C)		
PSL2700V12	N350 - Viscosity oil standard			500 mL
	Kinematic viscosity (nominal)			
	1400 mm^2/s,cSt (20 °C)	310 mm^2/s,cSt (40 °C)	24 mm^2/s,cSt (100 °C)	
	920 mm^2/s,cSt (25 °C)	180 mm^2/s,cSt (50 °C)		
	Dynamic viscosity (nominal)			
	1200 mPa.s,cP (20 °C)	270 mPa.s,cP (40 °C)	20 mPa.s,cP (100 °C)	
	790 mPa.s,cP (25 °C)	150 mPa.s,cP (50 °C)		
PSLN415	N415 - Viscosity oil standard			500 mL
	Kinematic viscosity (nominal)			
	1900 mm^2/s,cSt (20 °C)	415 mm^2/s,cSt (40 °C)	34 mm^2/s,cSt (100 °C)	
	1240 mm^2/s,cSt (25 °C)	240 mm^2/s,cSt (50 °C)		
	Dynamic viscosity (nominal)			
	1630 mPa.s,cP (20 °C)	360 mPa.s,cP (40 °C)	28.0 mPa.s,cP (100 °C)	
	1065 mPa.s,cP (25 °C)	200 mPa.s,cP (50 °C)		
PSL2700V13	S600 - Viscosity oil standard			500 mL
	Kinematic viscosity (nominal)			
	2400 mm^2/s,cSt (20 °C)	520 mm^2/s,cSt (40 °C)	35 mm^2/s,cSt (100 °C)	
	1600 mm^2/s,cSt (25 °C)	290 mm^2/s,cSt (50 °C)		
	Dynamic viscosity (nominal)			
	2100 mPa.s,cP (20 °C)	450 mPa.s,cP (40 °C)	29 mPa.s,cP (100 °C)	
	1400 mPa.s,cP (25 °C)	240 mPa.s,cP (50 °C)		

Viscosity

Code	Product				Unit
PSLN730	N730 - Viscosity oil standard				500 mL
	Kinematic viscosity (nominal)				
	3390 mm^2/s,cSt (20 °C) 2260 mm^2/s,cSt (25 °C)	730 mm^2/s,cSt (40 °C) 410 mm^2/s,cSt (50 °C)	49 mm^2/s,cSt (100 °C)		
	Dynamic viscosity (nominal)				
	2970 mPa.s,cP (20 °C) 1980 mPa.s,cP (25 °C)	630 mPa.s,cP (40 °C) 340 mPa.s,cP (50 °C)	40.0 mPa.s,cP (100 °C)		
PSL2700V14	N1000 - Viscosity oil standard				500 mL
	Kinematic viscosity (nominal)				
	4800 mm^2/s,cSt (20 °C) 3100 mm^2/s,cSt (25 °C)	940 mm^2/s,cSt (40 °C) 520 mm^2/s,cSt (50 °C)	55 mm^2/s,cSt (100 °C)		
	Dynamic viscosity (nominal)				
	4100 mPa.s,cP (20 °C) 2700 mPa.s,cP (25 °C)	800 mPa.s,cP (40°C) 450 mPa.s,cP (50°C)	45 mPa.s,cP (100 °C)		
PSLN1300	N1300 - Viscosity oil standard				500 mL
	Kinematic viscosity (nominal)				
	6760 mm^2/s,cSt (20 °C) 4365 mm^2/s,cSt (25 °C)	1320 mm^2/s,cSt (40 °C) 730 mm^2/s,cSt (50 °C)	77 mm^2/s,cSt (100 °C)		
	Dynamic viscosity (nominal)				
	5775 mPa.s,cP (20 °C) 3800 mPa.s,cP (25 °C)	1120 mPa.s,cP (40 °C) 630 mPa.s,cP (50 °C)	63.0 mPa.s,cP (100 °C)		
PSL2700V15	S2000 - Viscosity oil standard				500 mL
	Kinematic viscosity (nominal)				
	8600 mm^2/s,cSt (20 °C) 5600 mm^2/s,cSt (25 °C)	1700 mm^2/s,cSt (40 °C) 880 mm^2/s,cSt (50 °C)	81 mm^2/s,cSt (100 °C)		
	Dynamic viscosity (nominal)				
	7500 mPa.s,cP (20 °C) 4800 mPa.s,cP (25 °C)	1500 mPa.s,cP (40 °C) 760 mPa.s,cP (50 °C)	68 mPa.s,cP (100 °C)		
PSL2700V16	N4000 - Viscosity oil standard				500 mL
	Kinematic viscosity (nominal)				
	18000 mm^2/s,cSt (20 °C) 11000 mm^2/s,cSt (25 °C)	3400 mm^2/s,cSt (40 °C) 1700 mm^2/s,cSt (50 °C)	130 mm^2/s,cSt (100 °C)		
	Dynamic viscosity (nominal)				
	16000 mPa.s,cP (20 °C) 10000 mPa.s,cP (25 °C)	2900 mPa.s,cP (40 °C) 1500 mPa.s,cP (50 °C)	112 mPa.s,cP (100 °C)		
PSL2700V17	S8000 - Viscosity oil standard				500 mL
	Kinematic viscosity (nominal)				
	35000 mm^2/s,cSt (20 °C) 22000 mm^2/s,cSt (25 °C)	6700 mm^2/s,cSt (40 °C) 3200 mm^2/s,cSt (50 °C)	220 mm^2/s,cSt (100 °C)		
	Dynamic viscosity (nominal)				
	31000 mPa.s,cP (20 °C) 20000 mPa.s,cP (25 °C)	5900 mPa.s,cP (40 °C) 2700 mPa.s,cP (50 °C)	190 mPa.s,cP (100 °C)		
PSL2700V18	N15000 - Viscosity oil standard				500 mL
	Kinematic viscosity (nominal)				
	65000 mm^2/s,cSt (20 °C) 41000 mm^2/s,cSt (25 °C)	13000 mm^2/s,cSt (40 °C) 5800 mm^2/s,cSt (50 °C)	370 mm^2/s,cSt (100 °C)		
	Dynamic viscosity (nominal)				
	58000 mPa.s,cP (20 °C) 37000 mPa.s,cP (25 °C)	11000 mPa.s,cP (40 °C) 5100 mPa.s,cP (50 °C)	320 mPa.s,cP (100 °C)		
PSL2700V19	S30000-Viscosity oil standard				500 mL
	Kinematic viscosity (nominal)				
	82000 mm^2/s,cSt (25 °C)	23000 mm^2/s,cSt (40 °C)	11000 mm^2/s,cSt (50 °C)	670 mm^2/s,cSt (100 °C)	
	Dynamic viscosity (nominal)				
	74000 mPa.s,cP (25 °C)	21000 mPa.s,cP (40 °C)	9900 mPa.s,cP (50 °C)	580 mPa.s,cP (100 °C)	

Polymeric properties

Individual molecular weight polymer standards

Code	Product	Unit
NIST-2885	Polyethylene Certified value Molar Mass..... 6.28 x 10^3 g/mol	300 mg
NIST-2886	Polyethylene Certified value Molar Mass..... 87.0 x 10^3 g/mol	300 mg
NIST-2887	Polyethylene Certified value Molar Mass..... 196.4 x 10^3 g/mol	300 mg
NIST-1482A	Polyethylene Certified values Mass-average molar mass..... 13,600 g/mol Number-average molar mass ..... 11,400 g/mol Intrinsic viscosity ..... 40.1 mL/g	0.3 g

Molecular weight and melt flow

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 M_w by light scattering..... 179,300 g/mol M_w by sedimentation equilibrium ..... 189,800 g/mol LV in benzene (25 °C)..... 74.3 mL/g LV in benzene (25 °C)..... 74.5 mL/g LV in cyclohexane (25 °C)..... 35.4 mL/g For heat capacity please ask for detailed list	5 g
NIST-706A	Polystyrene - Broad molecular weight distribution Certified values Mass-average molar mass (M_w)..... 285,000 g/mol Indicative values for intrinsic viscosity in benzene at 25 °C and cyclohexane at 35 °C	18 g
NIST-1473B	Low densitiy polyethylene resin This material is certified for melt flow rate using ASTM D 1238-00, Test Method for Flow Rates of Thermoplastics by Extrusion Plastometer Standard Test Condition 190/2.16. The flow rate of the melt was determined at 190.0 °C ± 0.1 °C and a load of 2.16 kg by procedure A of the ASTM method. A manually operated extrusion plastometer was used. Certified value Melt flow rate (FR)..... 1.13 g/10 min	60 g
NIST-1474A	Polyethylene resin - Melt flow rate Certified for melt flow rate, FR-190/2.16, using ASTM Method D 1238-86 at 190 °C. Certified value Melt flow rate (FR)..... 5.10 g/10 min	60 g
NIST-1475A	Polyethylene, linear - Melt flow rate Certified for melt flow rate, FR-190/2.16, using ASTM Method D 1238-90b, and Limiting viscosity (LV). Certified values Melt flow rate..... 2.02 g/10 min Weight average MW (light scattering)..... 52,000 g/mol Number average MW (size exclusion chromatography)..... 18,310 g/mol Weight average MW (size exclusion chromatography) ..... 53,070 g/mol Z-average MW (size exclusion chromatography)..... 138,000 g/mol LV in 1-chloronaphthalene (130 °C)..... 89.0 mL/g LV in 1,2,4-trichlorobenzene (130 °C)..... 101.0 mL/g LV in decahydronapthalene (130 °C)..... 118.0 mL/g density..... 0.97844 g/cm^3	50 g
NIST-1476A	Branched polyethylene resin - Melt flow rate This Standard Reference Material® (SRM®) is intended for use in calibration and performance evaluation of instruments used in polymer technology and science for the determination of the melt flow rate using ASTM Method D1238-00. It is supplied as white pellets of polyethylene. This material is certified for melt flow rate using ASTM Method D1238-00 condition 190/2.16. Under this condition the melt flow rate is 1.23 g/10 min with a standard deviation of 0.036 g/10 min and with 29 degrees of freedom. The certified measurement uncertainty is found to be 0.110 g/10 min and is expressed as a combined expanded uncertainty with a coverage factor k = 2, calculated in accordance with ISO and NIST Guides procedure.	12 g
NIST-1478	Polystyrene - narrow molecular weight distribution Certified values Number average MW (membrane osmometry) ..... 35,800 g/mol Weight average MW (sedimentation equilibrium ultracentrifugation) ..... 37,400 g/mol Limiting viscosity in toluene (25 °C)..... 23.06 mL/g	2 g

Polymeric properties

Code	Product	Unit
NIST-1479	Polystyrene - narrow molecular weight distribution Certified value Weight average MW (light scattering)..... 1,050,000 g/mol	2 g
NIST-2888	Polystyrene Certified value Mass-average molar mass (M_w)..... 7.19 x 10^3 g/mol	0.3 g
NIST-1480	Polyurethane Certified value Weight average MW (light scattering)..... 47,300 g/mol Indicative value for limiting viscosity	1 g
NIST-1483A	Polyethylene, linear Certified values Mass-Average Molecular Mass (M_w) 32100 g/mol Number Average Molecular Mass (M_n) 28900 g/mol Intrinsic Viscosity 80.0 mL/g	300 mg
NIST-1484A	Polyethylene, linear - narrow molecular weight distribution Certified values Number-average MW (membrane osmometry) ..... 100,500 g/mol Weight average MW (light scattering)..... 119,600 g/mol Limiting viscosity in 1,2,4-trichlorobenzene (130 °C) ..... 197.9 mL/g Limiting viscosity in 1-chloronaphthalene (130 °C) ..... 169.4 mL/g	300 mg
NIST-1487	Poly(methylmethacrylate) Certified values Weight-average molecular weight (sedimentation equilibrium ultracentrifugation)..... 63,000 g/mol Limiting viscosity number in tetrahydrofuran (25 °C) ..... 7.9 mL/g	2 g
NIST-1488	Poly(methylmethacrylate) Certified values Number-average molecular weight (membrane osmometry)..... 29,300 g/mol Limiting viscosity in tetrahydrofuran (25 °C)..... 15.8 mL/g	2 g
NIST-1489	Poly(methylmethacrylate) Certified values Number-average molecular weight (membrane osmometry)..... 115,000 g/mol Limiting viscosity in tetrahydrofuran (25 °C)..... 37.4 mL/g	2 g
NIST-1496	Polyethylene gas pipe resin (unpigmented) Certified values Melt flow rate (FR-190/2.16, using ASTM Method D 1238-82) ..... 0.26 g/10 min Intrinsic viscosity in 1,2,4-trichlorobenzene (140 °C) ..... 210 mL/g	900 g
NIST-1923	Poly(ethylene oxide) - molecular weight Certified value Weight average molecular weight..... 26,900 g/mol	200 mg
NIST-1924	Poly(ethylene oxide) - molecular weight Certified value Weight average molecular weight..... 120,900 g/mol	200 mg
NIST-2491	Non-Newtonian polymer melt for rheology This Standard Reference Material® (SRM®) is intended primarily for use in calibration and performance evaluation of instruments used to determine the viscosity and first normal stress difference in steady shear, or to determine the dynamic mechanical storage and loss moduli and shift factors through time-temperature superposition. NIST-2491 consists of polydimethylsiloxane. The supplier identifies the polydimethylsiloxane as having a number average molecular mass of 308,000 g/mol. Certified values of the viscosity and first normal stress difference as functions of shear rate are given in the certificate at temperatures of 0 °C, 25 °C, and 50 °C, respectively. The expanded combined uncertainties in the certified values of the viscosity and first normal stress difference are also listed. The certified values of the storage modulus G' and loss modulus G" as functions of frequency at 0 °C, 10 °C, 20 °C, 30 °C, 40 °C, and 50 °C, respectively are also given in the certificate.	100 mL

Miscellaneous

Relative humidity

HM11 - HM90

Please specify the type of hygrometer to be used to enable the appropriate adapter to be supplied.

Code	Product	Unit
HM11	Relative humidity standard Nominal relative humidity..... 11 %	unit
HM22	Relative humidity standard Nominal relative humidity..... 22 %	unit
HM33	Relative humidity standard Nominal relative humidity..... 33 %	unit
HM54	Relative humidity standard Nominal relative humidity..... 54 %	unit
HM75	Relative humidity standard Nominal relative humidity..... 75 %	unit
HM80	Relative humidity standard Nominal relative humidity..... 80 %	unit
HM90	Relative humidity standard Nominal relative humidity..... 90 %	unit

Scanning electron microscope

NIST-2069B	SEM Performance Standard Graphitised rayon fibres with smooth and uniform edges on a 12.5 mm diameter SEM specimen mount with a 3 mm peg. One edge of a single fibre is used as a clearly defined boundary across which the electron beam is scanned. The slope of the resultant detector signal waveform is a measure of the SEM performance that can be related to the resolution capability of the SEM.	each
NIST-RM 8091	Scanning Electron Microscope Sharpness Standard This Reference Material (RM) is intended primarily for use in checking the sharpness of scanning electron microscopes. It is supplied as a small (3mm x 2 mm) diced semiconductor chip. Please ask for further details.	each

X-ray diffraction

NIST-656	Silicon nitride This Standard Reference Material (SRM®) consists of two powders intended for quantitative analysis of the α and β polymorphs of silicon nitride via powder diffraction methods. The powders are combinations of the α and β polymorphs; one is high in the α phase content (α 656), while the other contains a larger amount of the β polymorph (β 656).	2 x 10 g
NIST-674B	X-Ray powder diffraction intensity set This Standard Reference Material (SRM®) consists of four oxide powders intended primarily for use as internal standards for quantitative X-ray diffraction analysis. The powders are ZnO (wurtzite structure), TiO_2 (rutile structure), Cr_2O_3 (corundum structure), and CeO_2 (fluorite structure). These four oxides offer a range of linear attenuations for Cu-Kα radiation: 279 cm^{-1}, 536 cm^{-1}, 912 cm^{-1}, and 2203 cm^{-1}, respectively, that allow the user to nominally match that of standard to the unknown in order to minimize the effects of microabsorption. A unit of NIST-674b consists of approximately 10 g of each powder, bottled in an argon atmosphere. Certified values Phase purity and uncertainty Crystalline component — Phase Purity ZnO ..... 95.28 % ± 0.64 % TiO_2 ..... 89.47 % ± 0.62 % Cr_2O_3 ..... 95.91 % ± 0.60 % CeO_2 ..... 91.36 % ± 0.55 %	set
NIST-675	Mica x-ray diffraction Intended for use as an external or internal low 2 (large d-spacing) calibration standard for powder diffractometry. Certified value .....d(001) 9.98104 Å (based on the average of 28 refined d values at 25 °C uncorrected for refraction)	7.5 g
NIST-1976	Alumina plate, sintered Intended for use in the calibration of powder X-ray equipment for diffraction intensity as a function of 2θ angle (instrument sensitivity). Certified values (for lattice parameters) a ..... 0.4758846 nm σ ..... 0.0000109 c ..... 1.299306 nm σ ..... 0.0000238 (where (CuKα_1) 0.1540629 nm)	plate

Miscellaneous

Code	Product	Unit
NIST-1990	Single Crystal Diffractometer Alignment Standard - Ruby Sphere Standard Reference Material (SRM®) 1990 is intended primarily for use as an alignment standard for single crystal diffractometry. One unit consists of three chromium-doped single crystal aluminum oxide (ruby) spheres. The spheres are nominally 152 mm in diameter with 1.3 mm sphericity. The spherical geometry was chosen to facilitate alignment and to avoid corrections for absorption. These spheres produce reflections at high angles for copper and molybdenum radiation. The space group is R3c. Certified lattice parameters of NIST-1990 at 25 °C are: a: 0.476080 nm ± 0.000029 nm c: 1.299568 nm ± 0.000087 nm	3 spheres
NIST-1994	Standard silicon single crystal wafer for crystalline orientation This Standard Reference Material (SRM®) is intended for use in the calibration of instruments (X-ray diffractometers) used to measure the crystal orientation of wafers relative to the crystal surface. The SRM unit consists of a 100-mm diameter silicon wafer. The crystal orientation of the (001) silicon crystal planes relative to the surface normal has been measured both parallel and perpendicular to an edge flat that is manufactured into the wafer.	wafer

Density

Code	Product	Unit
NIST-211D	Toluene Certified values Temperature [°C] — Density [kg/m^3] 15 ..... 871.476 ± 0.025 20 ..... 866.828 ± 0.025 25 ..... 862.170 ± 0.025	4 x 5 mL
NIST-2214	Isooctane (2, 2, 4-Trimethylpentane) - Density Certified Values of NIST-2214 at three sample temperatures Temperature °C — Density, 15.000 ..... 695.969 ± 0.035 kg/m^3 20.000 ..... 691.872 ± 0.035 kg/m^3 Temperature °C — Density, 25.000..... 687.753 ± 0.035 kg/m^3	4x5mL
	HDF01 - HDF-012 Certified densities were determined by means of hydrostatic weighing.	
HDF01	2,2,4-Trimethylpentane Temperature range 15-25 °C Certified value Liquid density (20 °C)..... 692 kg/m^3	10 mL
HDF02	Dodecane Temperature range 10-50 °C Certified value Liquid density (20 °C)..... 750 kg/m^3	10 mL
HDF04	Base lubricating oil approx. 8 mPa.s at 40°C Temperature range 15-50 °C Certified value Liquid density (20 °C)..... 868 kg/m^3	10 mL
HDF05	Base lubricating oil approx. 30 mPa s at 40°C Temperature range 15-50 °C Certified value Liquid density (20 °C)..... 870 kg/m^3	10 mL
HDF06	Base lubricating oil approx. 110 mPa s at 40°C Temperature range 15-50 °C Certified value Liquid density (20 °C)..... 882 kg/m^3	10 mL
HDF07	Lubricating oil A90 approx. 160 mPa s at 40°C Temperature range 15-50 °C Certified value Liquid density (20 °C)..... 887 kg/m^3	10 mL
HDF08	Ethanol in water approx. 41 % ABV Use of this material is not recommended unless required by fiscal authorities. Certified value Liquid density (20 °C)..... 948 kg/m^3	10 mL
HDF09	Ethanol in water approx. 11 % ABV Use of this material is not recommended unless required by fiscal authorities. Certified value Liquid density (20 °C)..... 985 kg/m^3	10 mL

Code	Product	Unit
HDF15	Water Certified value Liquid density (20°C)..... 998 kg/m^3	10 mL
HDF10	Dextrose in water approx. 10 % by weight Use of this material is not recommended unless required by fiscal authorities. Certified value Liquid density (20 °C)..... 1037 kg/m^3	10 mL
HDF11	Dimethylphthalate approx. 17 mPa s at 20°C Temperature range 15 to 25°C Certified value Liquid density (20 °C)..... 1191 kg/m^3	10 mL
HDF13	Sodium bromide in water Temperature range 15-25 °C Certified value Liquid density (20 °C)..... 1264 kg/m^3	10 mL
HDF14	Caesium chloride in water approx. 47% by weight Certified value Liquid density (20°C)..... 1525 kg/m^3	10 mL
HDF12	Tetrachloroethylene Temperature range 15-50 °C Certified value Liquid density (20 °C)..... 1623 kg/m^3	10 mL
	GUM1.1 - GUM1.11 Liquid density standards certified by the Central Office of Measures (GUM). Intended for calibration and checking densimeters used for measuring density of liquids. Supplied with a certificate showing density values at temperatures from 20 °C to 50 °C, with an uncertainty 0.05 kg/m^3. Values for the first and second decimal place are given in the certificate for particular series.	
GUM 1.1	n-Hexane Certified value Density ..... 659 kg/m^3 at 20°C	10 mL
GUM 1.2	n-Heptane Certified value Density ..... 683 kg/m^3 at 20°C	10 mL
GUM 1.3	2,2,4-Trimethylpentane Certified value Density ..... 691 kg/m^3 at 20°C	10 mL
GUM 1.4	n-Nonane Certified value Density ..... 717 kg/m^3 at 20°C	10 mL
GUM 1.5	n-Octane Certifed value Density ..... 702 kg/m^3 at 20°C	10 mL
GUM 1.6	Methylcyclohexane Certified value Density ..... 769 kg/m^3 at 20°C	10 mL
GUM 1.7	Cyclohexane Certified value Density ..... 778 kg/m^3 at 20°C	10 mL
GUM 1.8	Toluene Certified value Density ..... 866 kg/m^3 at 20°C	10 mL
GUM 1.10	2,4-Dichlorotoluene Certified value Density ..... 1249 kg/m^3 at 20°C	10 mL
GUM 1.11	Tetrachloroethylene Certified value Density ..... 1623 kg/m^3 at 20°C	10 mL

Code	Product	Unit

Chemical resistance (durability) of glass

NIST-622 and NIST-623

These NIST Standard Reference Materials® are for checking test methods and calibrating equipment used to determine the resistance of glass containers to chemical attack. The values given represent the volume of fiftieth-normal sulphuric acid used to titrate to the methyl red end point of the alkaline extract from a crushed sample of glass after exposure to high purity water at 121 ^{0}C.

NIST-622 — Soda lime silica (durability) — 2.2 kg

Certified value

Volume of 0.02N H_2SO_4 ..... 7.67 mL

NIST-623 — Borosilicate glass — 2.2 kg

Certified value

Volume of 0.02N H_2SO_4 ..... 0.34 mL

Multi-test verification materials (MTVMs)

The Multi-Test Verification Materials (MTVMs) are unique because they enable a laboratory to use a single sample to validate different tests and instrumentation. Each unit is supplied with data for multiple types of internationally accepted test methods.

SS99850-0 — SETA MTVM Kerosine (Jet turbine fuel) — 500 mL

Test Name	ASTM-IP Method	Range	Amount/test
Distillation IBP	D86-IP123	140-180 °C	100 mL
Distillation 10 %	D86-IP123	159-188 °C	100 mL
Distillation 50 %	D86-IP123	192-218 °C	100 mL
Distillation 90 %	D86-IP123	220-247 °C	100 mL
Distillation FBP	D86-IP123	244-268 °C	100 mL
Distillation residue	D86-IP123	1.1-1.3 %vol	100 mL
Distillation loss	D86-IP123	0.4-0.7 %vol	100 mL
Flashpoint	IP170	35-60 °C	85 mL
Freezing point	D2386-IP16	–62 to -44°C	25 mL
Aromatics FIA	D1319-IP156	18.1-22.7 %vol	0.75 mL
Smoke point	D1322	20-25 mm	20 mL
Acid number	D3242-IP354	<0.100 mg KOH/g	100 mL
Mercaptans	D3227-IP342	0.0003 to 0.0100% (m/m)	40 mL

SS99851-0 — SETA MTVM Gas oil — 500 mL

Test Name	ASTM-IP Method	Range	Amount/test
Density at 15 °C	D1298-IP160	0.83-0.854 kg/L	200 mL
Distillation IBP	D86-IP123	160-190 °C	100 mL
Distillation 10 %	D86-IP123	200-242 °C	100 mL
Distillation 50 %	D86-IP123	260-290 °C	100mL
Distillation 90 %	D86-IP123	320-350 °C	100 mL
Distillation 95 %	D86-IP123	335-368 °C	100 mL
Distillation FBP	D86-IP123	350-385 °C	100 mL
Distillation residue	D86-IP123	1.25-1.42 %vol	100 mL
Distillation loss	D86-IP123	0.26-0.55 %vol	100 mL
Flashpoint	D93-IP34	56-80°C	75 mL
Cloud point	D2500-IP219	–17 to –4 °C	up to 38 mL
CFPP	IP309	–30.0 to –o °C	45 mL
Pour point	D97-IP15	-33 to –6 °C	up to 38 mL
Kin. Visc. (40 °C)	D445-IP71	2.3-3.5 mm^2/s	up to 40 mL
Lubricity HFRR	D6079; IP450	271 to 512 µm	2 mL
Water Karl Fischer	D1744; IP438	23.4 to 63.9 mg/kg	5 mL

SS99852-0 — SETA MTVM Fuel oil — 500 mL

Test Name	ASTM-IP Method	Range	Amount/test
Density at 15 °C	D1298-IP160	0.94-0.994 kg/L	200 mL
Pour point	D97-IP15	–14 to 17 °C	up to 38 mL
Kin. Visc. (50 °C)	D445-IP71	150-1800 mm^2/s	up to 500 mL
Kin. Visc. (100 °C)	D445-IP71	20-95 mm^2/s	up to 500 mL
Micro carbon	D4530;IP398	0.10 to 30.0 %(m/m)	2 mL
Flash point	D93 (b) - IP34(b);	92.3 to 121.6 °C	75 mL

SS99853-0 — SETA MTVM lubricating oil — 500 mL

Test Name	ASTM-IP Method	Range	Amount/test
Kin. Visc. (40 °C)	D445-IP71	70-160 mm^2/s	up to 40 mL
Kin. Visc. (100 °C)	D445-IP71	10-19 mm^2/s	up to 40 mL
Viscosity index	D2270-IP226	139-180	up to 80 mL
Pour point	D97-IP15	–49.1 to –33.9 °C	38 mL
Flash point	D93-IP34	196-213 °C	75 mL
Cold cranking sim.	D5293;IP383	3062-6896 mPa.s	5 mL

Code	Product	Unit
SS99854-0	SETA MTVM motor gasoline	500 mL

Test Name	ASTM-IP Method	Range	Amount/test
Motor octane no.	D2700	83-90	
Research octane no.	D2699	96-101	
Density at 15 °C	D1298-IP160	0.71-0.763 kg/L	200 mL
Distillation IBP	D86-IP123	32.0-39.0 °C	100 mL
Distillation 70 °C	D86-IP123	15-36 %vol	100 mL
Distillation 100 °C	D86-IP123	36-58 %vol	100 mL
Distillation 150 °C	D86-IP123	75-90 %vol	100 mL
Distillation FBP	D86-IP123	175-205 °C	100mL
Aromatics FIA	D1319-IP156	19-42 %vol	0.75 mL
Olefins FIA	D1319-IP156	1.5-15 %vol	0.75 mL
Saturates FIA	D1319-IP156	42-72 %vol	0.75 mL
Vapour Pressure	D5191; IP394	50 to 85 kPa	3 mL

Code	Product	Unit
SS99856-0	SETA MTVM bitumen	500 mL

Test Name	ASTM-IP Method	Range	Amount/test
Softening point	IP58	37-54 °C	7.5 mL
Needle penetration	IP49	41-200 Pen	130 mL

Mechanical properties

Code	Product	Unit
ERM-FA013	Charpy specimens 30 J (bars) A unit consists of five Charpy V-notch test pieces, which are rectangular steel bars of nominal dimensions 55 mm x 10 mm x 10 mm, with one V-notch, accurately machined to tolerances imposed in EN 10045-1 and ISO 148. Absorbed energy (KV) at 20 ± 2 °C.....30J nominal	set (5)
ERM-FA014	Charpy specimens 60 J (bars) A unit consists of five Charpy V-notch test pieces, which are rectangular steel bars of nominal dimensions 55 mm x 10 mm x 10 mm, with one V-notch, accurately machined to tolerances imposed in EN 10045-1 and ISO 148. Absorbed energy (KV) at 20 ± 2 °C.....60J nominal	set (5)
ERM-FA015	Charpy specimens 80 J (bars) A unit consists of five Charpy V-notch test pieces, which are rectangular steel bars of nominal dimensions 55 mm x 10 mm x 10 mm, with one V-notch, accurately machined to tolerances imposed in EN 10045-1 and ISO 148. Absorbed energy (KV) at 20 ± 2 °C.....80J nominal	set (5)
ERM-FA016	Charpy specimens 120 J (bars) A unit consists of five Charpy V-notch test pieces, which are rectangular steel bars of nominal dimensions 55 mm x 10 mm x 10 mm, with one V-notch, accurately machined to tolerances imposed in EN 10045-1 and ISO 148. Absorbed energy (KV) at 20 ± 2 °C.....120J nominal	set (5)
ERM-FA415	Charpy specimens 160 J A unit consists of five Charpy V-notch test pieces, which are rectangular steel bars of nominal dimensions 55 mm x 10 mm x 10 mm, with one V-notch, accurately machined to tolerances imposed in EN 10045-1 and ISO 148. Absorbed energy (KV) at 20 ± 2 °C.....160J nominal	set (5)
NIST-2092	Low-Energy Charpy (10 -20 J) NIST-2092 is intended primarily for the verification of Charpy V-Notch machines in accordance with the current ASTM Standard E23.	set
NIST-2096	High Energy Charpy (88 - 136J) NIST-2096 is intended primarily for the verification of Charpy V-Notch machines in accordance with the current ASTM Standard E23.	set
NIST-2098	Super High-Energy Charpy (176 - 244J) NIST-2098 is intended primarily for the verification of Charpy V-Notch machines in accordance with the current ASTM Standard E23.	set
BCR-425	Nimonic 75 - Creep rate 150 mm long 14 mm diameter bars of Nimonic 75. Testing conditions: T = 600 °C, σ = 160 Mpa Certified values Creep rate at 400 h ..... 72 x 10^{-6}/h time to 2 % strain ..... 278 h time to 4 % strain ..... 557 h	set (3)
BCR-661A	Nimonic 75 for ambient air tensile properties The material is Nimonic 75 nickel base alloy. It will be issued in units of three bars each about 150 mm long x 14 mm diameter, sufficient for the manufacture of three test-pieces. Certified values for tensile properties according to EN10002-1 0.2% Proof stress $R_{p0.2}$ .....300 ± 7 MPa 0.5% Proof stress $R_{p0.5}$ .....318 ± 7 MPa Tensile strength R_m.....750 ± 13 MPa Elongation at fracture A.....40.9 ± 0.9 % Reduction in area at fracture Z.....60 ± 4 %	set (3)

Miscellaneous

Code	Product	Unit
BCR-661B	Nimonic 75 for ambient air tensile properties The material is Nimonic 75 nickel base alloy. It will be issued as one bar with about 500 mm long x 14 mm diameter. Certified values for tensile properties according to EN10002-1 0.2% Proof stress $R_{p0.2}$.....300 ± 7 MPa 0.5% Proof stress $R_{p0.5}$.....318 ± 7 MPa Tensile strength R_m.....750 ± 13 MPa Elongation at fracture A.....40.9 ± 0.9 % Reduction in area at fracture Z.....60 ± 4 %	rod
BCR-692	Scratch test reference material A reference material certified for critical loads for cohesive/adhesive failures during scratch testing (prEN 1071-3). The reference samples are (30x30x5) mm steel coupons coated with a diamond-like carbon coating (DLC)applied by plasma-assisted chemical vapour deposition. The coupons are distributed in a reusable plastic box containing desiccant.	coupons
NIST-2100	Fracture Toughness of Ceramics NIST-2100 is intended for verification of fracture toughness testing procedures and consists of a set of five hot-pressed silicon nitride flexure specimens cut from a single billet (plate) of material. This SRM may be used with any fracture toughness test method, but is optimized for beam bending testing configurations. The SRM may be used in conjunction with American Society of Testing and Materials (ASTM) fracture toughness standard C1421-99 (or the Provisional Standard PS070-97 which preceded it) [1]. This SRM may also be used with two International Organization for Standardization (ISO) standard tests under development by ISO Technical Committee TC 206, Fine Ceramics.	5 bars

Physico-chemical properties

Magnetic moment

NIST-762	Magnetic moment standard - Nickel disk This Standard Reference Material© (SRM©) is intended for use in the calibration of magnetometers (such as vibrating sample magnetometers) used in the measurement of the magnetic properties of materials. NIST-762 consists of a nickel disk nominally 6 mm in diameter with a thickness of 0.127 mm and a mass of 32 mg ± 1 mg. The NIST-762 lot was produced from rolled nickel sheet with a purity of 99.999 %. Disks were punched from the sheet. Before measurement, the disks were ultrasonically cleaned in acetone, then methyl alcohol. The certified value for specific magnetization, σ at 298 K and in an applied magnetic field of 398 kA/m (5000 oersted, Oe) with the magnetic field aligned parallel to the plane of the disk is: σ= 54.78 A m^2/kg ± 0.15 A m^2/kg (54.78 emu/g ± 0.15 emu/g)	6 mm dia.
NIST-764A	Magnetic susceptibility standard - Platinum cylinder This Standard Reference Material (SRM®) is intended for use in the calibration of magnetometers (such as vibrating sample magnetometers) used in the measurement of the magnetic properties of materials. NIST-764a consists of a platinum (Pt) cylinder with a nominal diameter of 3 mm, a nominal length of 3.42 mm, and a nominal mass of 620 mg. NIST-764a lot was produced by slicing a pure (99.99 %) platinum rod into 3.42 mm long pieces.	3 mm dia.
NIST-2853	Magnetic moment standard yttrium iron garnet sphere This Standard Reference Material (SRM®) is intended for use in calibrating of magnetometers (such as vibrating sample magnetometers) used in the measurement of the magnetic propterties of materials. NIST-2883 consists of a yttrium iron garnet (YIG) sphere with a nominal diameter of 1 mm and a nominal mass of 2.8 mg.	each
NIST-772A	Nickel sphere for magnetic moment This Standard Reference Material (SRM) is intended for use in the calibration of magnetometers (such as vibrating sample magnetometers) used in the measurement of the magnetic properties of materials. SRM 772a consists of a nickel sphere 2.383 mm in diameter with a mass of 63.16 mg. The SRM 772a lot was produced from annealed nickel wire with a purity of 99.999 %. The wire was ground into spheres. The spheres were then ultrasonically cleaned in acetone and methyl alcohol and annealed at 1220 K in a dry hydrogen atmosphere for 2 h. The microstructure is equiaxed with an average grain size of about 100 µm. The certified value for magnetic moment, m, at 298 K and in an applied field of 398 kA/m (5000 Oe) is m = 3.47 mA•m^2 ± 0.01 mA•m^2 (3.47 emu ± 0.01 emu)	each

Miscellaneous

NIST-953	Cobalt in aluminium - Neutron density monitor wire The standard is provided as a reference source of cobalt in aluminium alloy to serve as a neutron density monitor wire standard.	1 m
NIST-963A	Fission track glass This Standard Reference Material (SRM®) was produced and certified for use in uranium fission track analysis and monitoring neutron fluences. The SRM is made up of: four unirradiated glass wafers, two irradiated glass wafers, a muscovite mica and polycarbonate detectors.	set (6)
NIST-1002D	Hard Board - Surface flammability This Standard Reference Material (SRM®) is intended for use in checking the operation of radiant-panel equipment in accordance with the calibration and standardisation technique describes in ASTM Standard E162-78 Test for Surface Flammibility using a Radiant Heat Source.	set (4)

Code	Product	Unit
NIST-1082	Cigarette ignition strength standard This Standard Reference Material (SRM®) is intended for use by test laboratories to assess and control their testing of cigarette ignition strength in accordance with ASTM Standard Methods E 2187-04 (or ASTM E2187-02b). The SRM unit consists of one carton of cigarettes containing 10 packs of 20 cigarettes each. Certified value Measurand — ASTM Method — Certified Value and Expanded Uncertainty Ignition Strength (on 10 layers of filter paper) — E 2187-04(a) — 12.6 % ± 3.3 %	10 packs
NIST-1006D	Smoke density chamber standard for non-flaming exposure condition This Standard Reference Material consists of paper sheets, principally -cellulose, derived from wood chips. The SRM is intended primarily for checking the operation of smoke density chambers under non-flaming exposure conditions in accordance with the prescribed calibration and standardization techniques outlined in the American Society for Testing and Materials (ASTM) Standard Test Method E 662-95 “Standard Test Method for Specific Optical Density of Smoke Generated by Solid Materials”, and in National Fire Protection Association (NFPA) 258-1998, “Standard Research Test Method for Determining Smoke Generation of Solid Materials”. A unit consists of nine single layer sheets, each 172 mm x 254 mm x 1.65 mm thick. The certified value and expanded uncertainty [3] for maximum specific optical density of a single layer thickness is: Dm = 210 ± 18 (without correction for window deposit) Dm corr. = 193 ± 20	9 sheets
NIST-1810A	Linerboard - Tape adhesion testing (sheet form) This Standard Reference Material (SRM®) is intended to provide a uniform source of linerboard for use with ASTM D 2860 Standard Test Method for Adhesion of pressure-sensitive tape to fiberboard at 90 degree angle and constant stress. Each unit consists fo fifty 21.6 cm x 28 cm (8.5 in x 11 in) linerboard sheets of Mosinee 696-C paper, sealed in a moisture resistent foil-lined package.	50 each
NIST-2490	Non-Newtonian Polymer Solution for Rheology - Polyisobutylene Dissolved in 2,6,10,14-Tetramethylpentadecane Please ask for details	100 mL
NIST-2810	Rockwell C Scale Hardness (High Range) This Standard Reference Material (SRM®) is a transfer standard intended primarily for use in calibration and verification of the performance of Rockwell hardness equipment using the Rockwell C Hardness Scale (HRC).	each
NIST-2811	Rockwell C Scale Hardness (High Range) This Standard Reference Material (SRM®) is a transfer standard intended primarily for use in calibration and verification of the performance of Rockwell hardness equipment using the Rockwell C Hardness Scale (HRC).	each
NIST-2812	Rockwell C Scale Hardness (High Range) This Standard Reference Material (SRM®) is a transfer standard intended primarily for use in calibration and verification of the performance of Rockwell hardness equipment using the Rockwell C Hardness Scale (HRC).	each
NIST-RM 8130	Coplanar waveguide calibration set This Reference Material (RM) is intended for use by industrial laboratories that wish to implement the procedure described in Part 1 of the NIST/Industrial MMIC Consortium´s "Proposed Procedures for Verifying Probe Station Integrity and On-wafer Measurement Accuracy" for the measurement of microwave probe station stability and for verifying the ability to repeat on-wafer microwave measurements performed at NIST.	each
NIST-RM 8458	Artificial flaw for eddy current nondestructive evaluation This Research Material (RM), the Capobianco, Dube, Fizer (CDF) notch, provides a reproducibility flaw of a known size and geometry that closely resembles an actual fatigue crack. It is intended to produce a response suitable for calibrating an eddy current nondestructive evaluation (NDE) system.	each

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