

Starna®

Certified Reference Materials
for UV and Visible Spectroscopy



Introduction



UV and Visible Spectrophotometry is one of the most common techniques used in analytical science. Procedures using this methodology are found in analytical, clinical and research laboratories, and find extensive use in a Quality Assurance environment. The technique is fundamentally both accurate and precise, but it is essential to check instrument performance on a regular basis to ensure that it is within satisfactory parameters i.e. “under control”, and to allow for corrective action to be taken when found to be outside these limits.

With an increasing requirement for laboratories to be accredited to at least one of the internationally recognised standards of GLP, ISO/IEC 17025 or ISO 9001, this “evidence of control” has become an absolute necessity. As has the use of Certified Reference Materials with a defined traceable path to national or internationally recognised primary materials or procedures.

Optiglass has over thirty years experience in the development and production of Starna® liquid-filled, heat sealed quartz cells which possess the good long-term stability and optical properties needed to evaluate performance of UV-Visible spectrophotometers. The range also includes solid glass filter materials for both absorbance and wavelength measurements. The full range of Certified Reference Materials established traceable to the USA National Institute of Standards and Technology (NIST) currently available are described in detail in the following pages, together with the necessary information for ordering a set to meet your exact requirements.

The ability to customise your requirements is unique to Starna®, and allows for the compilation of a certified set from available reference materials.

Qualification of the reference spectrophotometer is consistent with the most exacting requirements of any regulated environment, and is documented as appropriate on each supplied certificate. In addition to the measured values, certificates also detail how to use, clean, and store the Certified Reference Material.

To ensure the on-going quality of the calibration validation process, recertification of these Certified Reference Materials is an essential requirement, and this process is also documented in the following pages.

Stored, handled, and used correctly Starna® Certified Reference Materials have a long working life in providing that essential evidence of control for your spectrophotometer.

Frequently asked questions

We are often asked the two primary questions:

1. What is traceability?
2. How is this traceability achieved with the Starna® range of Certified Reference Materials?



Before answering these questions, we must establish what is meant by “Calibration”, and why is it important?

- **What is calibration?**

Calibration is the process of establishing how the response of a measuring device varies with respect to the instrument parameter being measured. The usual way to perform calibration is to measure the parameter (e.g. using a reference material) and monitor the instrument response.

- **Why is it important?**

Place any equipment in the environment of choice, and immediately the chosen environment will begin to act on that equipment causing change; and ultimately degradation in performance. This so called drift, causes your results to become unreliable and no longer “fit for their intended purpose”. Whilst drift cannot be eliminated it can be detected and contained through the process of calibration. In the pharmaceutical industry, a system where drift has occurred to an unacceptable level is deemed to be “out of control”.

By inference, this same environment will also act on your Certified Reference Materials to a greater or lesser degree, be depending on how they are stored, etc. and these materials must be checked/re-certified to ensure that the values on which you are depending have not also significantly changed.



- **What is traceability?**

National Standards Laboratories (NIST, NPL, etc.) work together to agree a common definition for measurement units. These then make up the International System of units, SI. e.g. kilogram, second, metre, ampere, candela, and the Standards Laboratories will then “realise” units from internationally agreed SI definitions to establish primary national measurement scales.

Traceability is defined in the “International Vocabulary of Basic and General Terms in Metrology (ISO, 1993)” as the... *“property of the result of a measurement of the value of a standard whereby it can be related to stated references, usually national or international standards, through an unbroken chain of comparisons all having stated uncertainties.”*

- **How is this traceability achieved with Starna[®] materials?**

Where appropriate, calibration certificates are issued where the certification process has established traceable links to a USA National Institute for Standards and Technology (NIST) Standard Reference Material (SRM) to determine the appropriate filter parameters.

Using procedures consistent with the operation within an ISO/IEC 17025 environment, all certification measurements are bracketed by use of an appropriate NIST primary SRM. In addition the fundamental characteristic of the reference spectrophotometer are periodically established using physical references. For example, wavelength calibration is verified using line spectra from a mercury emission source.

- **What does traceability achieve?**

Measurements are made against a consistent set of units and there is international equivalence of national measurement scales. It also means that compatible measurements are made across national borders, resulting in unambiguous and reliable communication of specifications.

- **What does ISO/IEC 17025 accreditation achieve?**

It provides an independent third party technical audit on all processes and procedures performed within the Calibration Laboratory. Through the International Laboratory Accreditation Corporation (ILAC), accreditation to the ISO/IEC 17025 standard is recognised on a world-wide basis.

Care and handling of Certified Reference Materials (RMs)

- Always store the reference(s) in the box when not in use. Handle with extreme care, like any fragile component. Remove dust from the optical faces by blowing dry air on to the surface.
- Only use a dry optical tissue to remove other contamination. Breakage, scratching of the optical faces, or cracking voids the certification.
- Insert and remove cell based Certified Reference Materials from the instrument cell holder using the circular top, and make sure not to place side loads or twist on the cell.



References

Glossary:

Absorbance	Negative logarithm (base 10) of the transmittance.
Certified Reference Material	A certified reference material issued by Starna® where the traceability has been established to appropriate NIST Standard Reference Materials (SRMs).
Double Aperture	The implicit standard methodology used to calibrate the detector linearity of national reference spectrophotometers.
Far UV	Radiation at the shortwave end of the UV region. Generally accepted to be the region between 190 and 250 nm.
GLP	Good Laboratory Practice.
ISO 9001	International Standard for quality management and quality assurance.
ISO/IEC 17025	International Standard for the accreditation of Testing or Calibration Laboratories, formally ISO/IEC Guide 25.
SBW	Spectral Bandwidth, also known as Spectral slit width (SSW), spectral bandpass, and instrument function; a measure of the monochromaticity of the light of a given spectrophotometer.
Transmission	The process by which radiation passes through material. It therefore represents radiation that is not absorbed, scattered or otherwise dispersed by the material.
UV-Visible spectrophotometer	An instrument designed to operate through the UV and visible regions, i.e. from 180 to 800 nm.

Standards:

ASTM E275-01 Standard Practice for Describing and Measuring Performance of Ultraviolet, Visible, and Near-Infrared Spectrophotometers

ASTM E387-84 Standard Test Method for Estimating Stray Radiant Power Ratio of Spectrophotometers by the Opaque Filter Method

Bibliography:

Standards and Best Practice in Absorption Spectrometry

Edited by Chris Burgess and Tom Frost UVSG. ISBN 0-632-05313-5 Blackwell Science
<http://www.blackwell-science.com>

NIST Special Publication 260-54

Standard Reference Materials:

Certification and use of Acidic Potassium Dichromate Solutions as an Ultraviolet Absorbance Standard – SRM 935

NIST Special Publication 260-116

Standard Reference Materials:

Glass Filters as a Standard Reference Material for Spectrophotometry – Selection, Preparation, Certification, and Use of SRM 930 and SRM 1930

NIST Special Publication 260-102

Standard Reference Materials:

Holmium Oxide Solution Wavelength Standard From 240 to 640 nm – SRM 2034

NIST Special Publication 260-140

Standard Reference Materials:

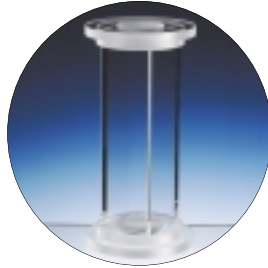
Technical Specifications for Certification of Spectrophotometric NTRMs



Starna® accessories



• Spectrophotometer Cells



• UHV Cells



• Flow Cells



• Fluorescence Reference Materials



• Fluorescence Cells

For further information, contact your local Starna® representative.





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