

Thermo Scientific SPECTRONIC Certified Standards

Low-cost, traceable standards and filters for routine performance verification of UV-Visible spectrophotometers

Ensure the accuracy and reliability of your data by verifying the performance of your spectrophotometer. The Thermo Scientific™ SPECTRONIC™ Certified Standards are the tools you need to design and implement routine verification procedures.

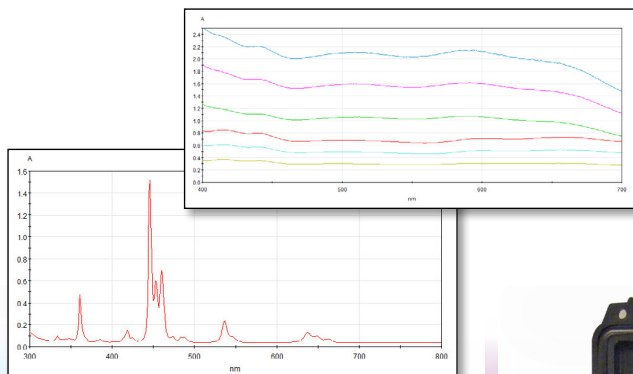
Performance Verification

Establishing confidence in the quality of your data is an important aspect of analytical laboratory operation. Performance verification procedures allow you to measure how closely your instrument can reproduce the values obtained by an instrument in a controlled and certified reference laboratory. SPECTRONIC Certified Standards are produced and calibrated in the Thermo Fisher Scientific NVLAP* accredited laboratory in Madison, Wisconsin, USA. When your instrument measures standard materials accurately you can be confident that it delivers accurate data for your own samples too.

* NVLAP code number 200955-0

Performance Testing in Your Lab

SPECTRONIC Certified Standards are an easy-to-use, accurate and reliable way to validate your UV-Visible or Visible spectrophotometer's performance. The process of verifying instrument performance is as simple as using an ordinary cuvette. Insert the standard into the spectrophotometer's cuvette holder and measure. Each SPECTRONIC Certified Standard is individually tested and certified to be accurate, with absorbance values traceable to the National Institute of Standards and Technology (NIST) and wavelengths traceable to fundamental physical standards. When the difference between your result and the calibrated value is within the accuracy specification for your instrument, you can record a PASS result for the performance test in your compliance log and continue testing samples with confidence.



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► Performance Validation Parameters

Wavelength Accuracy

Wavelength Accuracy defines how accurately the monochromator in your instrument selects the specified wavelength. This parameter is measured by scanning a calibrated standard with peaks at known and certified wavelengths, and comparing the measured value to the calibrated value. Your instrument must measure very close to the intended wavelength in order to report an accurate absorbance for a particular peak.

Photometric Accuracy

Photometric Accuracy defines how accurately your instrument measures absorbance values. This is the most direct measurement of whether your spectrophotometer delivers the right answer. Photometric accuracy is measured by recording the absorbance of a calibrated standard at a specific certified wavelength and comparing the measured value to the calibrated value.

Stray Light

Stray Light, also called “Stray Radiant Energy” or SRE, is light at wavelengths other than the intended measurement wavelength. The effect of stray light is to limit the absorbance measurement range of the instrument and to cause it to read low when measuring at higher absorbance levels. The stray light filters are designed to have zero transmittance at the test wavelength. With these filters in place, any transmittance measured at the test wavelength is stray light.

Photometric Linearity

Photometric Linearity is the range over which the instrument delivers the correct absorbance value. In general, doubling the concentration of an analyte will result in a doubling of the measured absorbance. However, as measurements approach higher and higher absorbance values there is exponentially less light falling on the detector and the influence of stray light on the observed reading becomes more significant. A plot of measured vs. calibrated absorbance value for a series of increasingly dark absorbance standards allows you to see whether your instrument deviates from linearity within the photometric range tested.

Zero Percent Transmittance

Older spectrophotometers may have an adjustment for 0% T that needs to be set manually before each measurement at a selected wavelength. Newer units can be tested to verify that they are free of light leaks and dark-current correction errors by confirming that they read zero when the beam is blocked. Place any of the standards into the instrument’s cuvette holder so that the glass is at 90° to the beam in order to block the beam to set or verify 0% T.

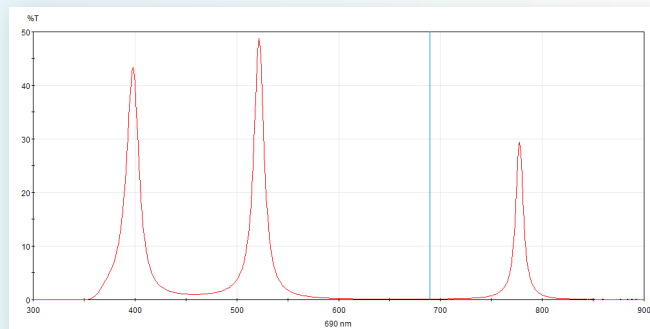


SPECTRONIC Certified Standard Products

SPECTRONIC Standards 2 Kit

- A single calibrated wavelength standard with three peaks for verifying wavelength accuracy at nominal wavelengths of 400, 520 and 780 nm.
- Four calibrated neutral density standards with nominal absorbance values of 0.3A, 0.5A, 1A and 1.5A for measuring photometric accuracy across the full range of common analyses.
- Two stray light filters: SRE 220 for use in UV-Vis spectrophotometers and SRE 400 for use in Visible spectrophotometers.

Part Number: 840-253100

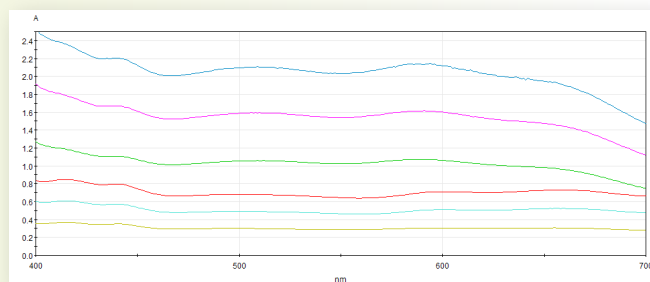


Scan of wavelength standard

Photometric Accuracy and Linearity Test Kit

- Six neutral density glass standards with nominal absorbance values of 0.3A, 0.5A, 0.7A, 1A, 1.5A and 2A. Each standard is calibrated at five wavelengths from 440 nm to 635 nm. Use this kit to verify photometric accuracy and linearity across the entire range of nearly all standard protocols.

Part Number: 840-253000

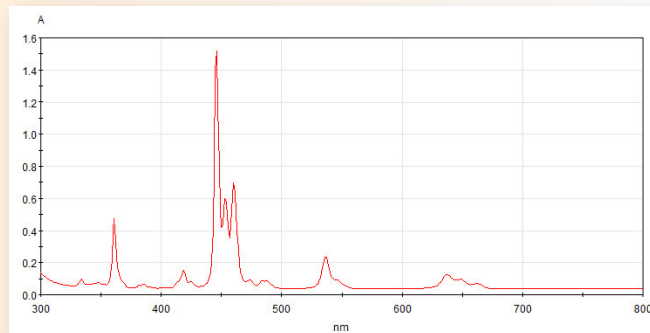


Scan of six absorbance standards

Wavelength Standards, Holmium and Didymium

- Holmium glass wavelength standard calibrated for absorbance peaks at nominal wavelengths of 279, 287, 334, 361, 419, 446, 460, 536 and 638 nm. Use this standard to verify wavelength accuracy with high precision in the UV and Visible regions. Certificate values are listed at 1, 2 and 4 nm spectral bandwidths.
- Didymium glass wavelength standard calibrated for transmittance peaks at nominal wavelengths of 473, 513, 530, 585, 685, 748, 807 and 879 nm. Use this standard to verify wavelength accuracy close to your analytical wavelength for colorimetric analyses. Certificate values are listed at 1, 2 and 4 nm spectral bandwidths.

Part Number: 840-253200



Scan of holmium glass standard

Wavelength Standard – Holmium

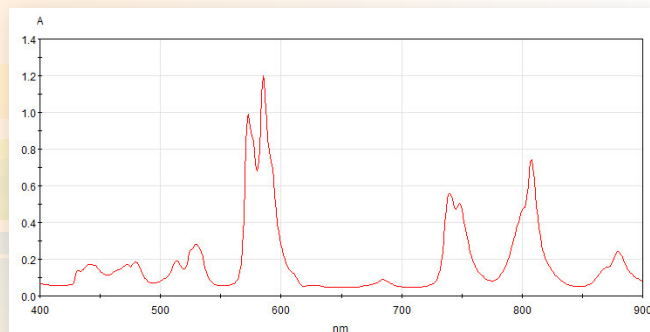
- Single calibrated holmium glass standard

Part Number: 840-266700

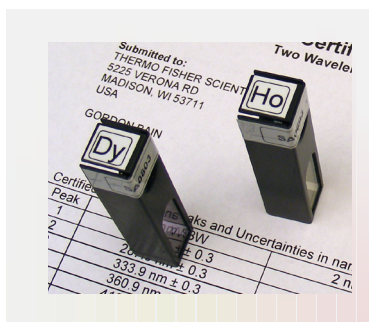
Wavelength Standard – Didymium

- Single calibrated didymium glass standard

Part Number: 840-266800



Scan of didymium glass standard



Using the Standards

Each standard is a piece of glass mounted in a metal holder sized to fit into the standard square cuvette holder of any spectrophotometer. To make a measurement, simply record a blank or baseline with the cuvette holder empty, then insert the standard and make the appropriate measurement. Record the result, calculate the difference from the calibrated value and compare this difference to the performance specification for your instrument.

Periodic Performance Verification Protocols

Many laboratories have standard operating procedures (SOPs) that call for periodic testing of instrumentation to ensure that it is in good working order. Successful completion of these performance verification protocols ensures that experimental results obtained with the instrument can be viewed with a high level of confidence. The interval for periodic testing may be as long as six months or as short as a day. Some SOPs for individual analyses even call for measurement of a standard with each batch of samples.

The two most important indicators that a spectrophotometer is giving the right answer are wavelength accuracy and photometric accuracy. Most analyses rely on measuring the absorbance at the top of a peak in the absorbance spectrum. If the spectrophotometer measures at the wrong wavelength, it may not be measuring at the top of the peak, and will consequently give a lower result than the true absorbance. Photometric accuracy is a measure of how accurately the spectrophotometer reports absorbance.

A typical periodic performance verification (PV) test set would include a check for both these parameters at wavelengths chosen to be as close as possible to the common measurement wavelengths used in the particular laboratory. For example, a lab that routinely performs analyses at 420 nm in an absorbance range of 0.1 to 1.2, might use the SPECTRONIC Standards 2 kit. The chosen tests could include wavelength accuracy using the peak in the lambda filter at approximately 400 nm and photometric accuracy at 440 nm using all four neutral density filters. These checks might be performed weekly. Further checks for stray light, 0% T, noise and drift might be performed at monthly or quarterly intervals.

Spectral Bandwidth Considerations

Narrow peaks in an absorbance spectrum may appear with different heights and slight differences of position at different spectral bandwidth. To make the SPECTRONIC Certified Standards as broadly applicable as possible, peak wavelengths are certified at 1, 2 and 4 nm spectral bandwidths. Neutral density filters used for photometric accuracy testing do not have peaks and are therefore not impacted by variations in spectral bandwidth.

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