Schedule of Accreditation

issued by

United Kingdom Accreditation Service

2 Pine Trees, Chertsey Lane, Staines-upon-Thames, TW18 3HR, UK

0659

Accredited to ISO/IEC 17025:2017

Starna Scientific Ltd

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Calibration performed at the above address only

Calibration and Measurement Capability (CMC)

Measured Quantity Instrument or Gauge	Range	Expanded Measurement Uncertainty (k = 2)	Remarks
OPTICAL DENSITY (ABSORBANCE)			Comparison against reference standards
Sealed liquid cells containing nicotinic acid solution prepared from AR grade material	Absorbance in the range 0.050 A to 1.090 A, dependent on concentration and wavelength *At 213 and 261 nm:* Solution concentration 6 mg/l 12 mg/l 18 mg/l 24 mg/l	 0.0037 A 0.0037 A 0.0037 A 0.0037 A	
Sealed liquid cells containing potassium dichromate solution prepared from NIST SRM 935a	Absorbance in the range 0.096 A to 3.552 A, dependent on concentration and wavelength *At 235 nm, 257 nm, 313 nm and 350 nm:* Solution concentration 20 mg/l 40 mg/l 60 mg/l 80 mg/l 100 mg/l 120 mg/l 140 mg/l 160 mg/l 180 mg/l 200 mg/l 220 mg/l 240 mg/l	 0.0037 A 0.0045 A 0.0049 A 0.0058 A 0.0068 A 0.0084 A 0.0091 A 0.0098 A 0.011 A 0.012 A 0.013 A 0.013 A	
Sealed liquid cell containing potassium dichromate solution prepared from NIST SRM 935a	Absorbance value in the range 0.948 A to 0.960 A *At 430 nm:* Solution concentration 600 mg/l	 0.0043 A	

Measured Quantity Instrument or Gauge	Range	Expanded Measurement Uncertainty (k = 2)	Remarks
OPTICAL DENSITY (ABSORBANCE) (cont'd)			Comparison against reference standards
Sealed liquid cells containing DNACON 260/280®	*At 260 nm, 280 nm and 330 nm:* Absorbance value in the range 0.0 A to 1.0 A	0.0043 A	
Sealed liquid cells containing Toluene/Hexane	*At peak/trough values in the range 265 nm to 270 nm:* Absorbance values in the range 0.1 A to 0.5 A	0.0049 A	
Neutral density glass filters	*At 440 nm, 465 nm, 546.1 nm, 590 nm and 635 nm:* Nominal transmittance, T		
	92 % (0.063 A)	0.0027 A	
	79 % (0.100 A)	0.0027 A	
	73 % (0.137 A)	0.0027 A	
	60 % (0.222 A)	0.0027 A	
	56.5 % (0.148 A)	0.0027 A	
	50 % (0.301 A)	0.0027 A	
	40 % (0.398 A)	0.0027 A	
	30 % (0.523 A)	0.0027 A	
	25 % (0.602 A)	0.0027 A	
	20 % (0.699 A)	0.0027 A	
	10 % (1.000 A)	0.0027 A	
	6 % (1.222 A)	0.0052 A	
	3 % (1.523 A)	0.0052 A	
	1.5 % (1.824 A)	0.0052 A	
	1.0 % (2.000 A)	0.0059 A	
	0.3 % (2.523 A)	0.011 A	
	0.1 % (3.000 A)	0.019 A	
Neutral density glass filters	*At 1100 nm, 1700 nm, 2210 nm, 2500 nm and 2850 nm:* Nominal transmittance, T		
	61% to 19 % (0.215 A to 0.721 A)	0.0035 A	
	5.7 % (1.244 A)	0.0046 A	
	2.9 % (1.538 A)	0.0072 A	
	1.5 % (1.824 A)	0.011 A	
Neutral density Metal-on-Quartz filters	*Nominal transmittance, T (250 to 635 nm)*		
	90 % (0.03 A)	0.0020 A	
	60 % (0.22 A)	0.0025 A	
	50 % (0.30 A)	0.0025 A	
	30 % (0.523 A)	0.0040 A	
	10 % (1.000 A)	0.0045 A	
	3.0 % (1.523 A)	0.0058 A	
	1.0 % (2.000 A)	0.0059 A	

Measured Quantity Instrument or Gauge	Range	Expanded Measurement Uncertainty (k = 2)	Remarks
WAVELENGTH			Comparison against reference standards
Sealed liquid cells containing "Rare Earth" (RE) solution. Multiple peak wavelengths reported.	200 nm to 300 nm	0.18 nm	
Sealed liquid cells containing Rare Earth solution. Multiple peak wavelengths reported.	240 nm to 870 nm	0.11 nm	
Rare Earth glass filters. Multiple peak wavelengths reported.	240 nm to 880 nm	0.10 nm	
Sealed vapour cell containing benzene. Multple peak wavelengths reported.	250 nm to 270 nm	0.10 nm	
Sealed liquid cells containing TS5 Organic matrix solution. Multiple peak wavelengths reported.	990 nm to 2540 nm	0.44 nm	
Sealed liquid cells containing inorganic "cut-off" solutions with reference transition wavelengths. Transition wavelength at 1.0 T% reported.	190 nm to 385 nm	0.10 nm	
Glass "cut-off" filters with reference transition wavelengths. Transition wavelength at 1.0 T% reported.	275 nm to 700 nm	0.10 nm	
Wavenumber, v for QA checks on mid-IR spectrophotometers	*Nominal Values:* 539.85 cm-1 841.78 cm-1 906.62 cm-1 1028.27 cm-1 1069.19 cm-1 1154.60 cm-1 1582.98 cm-1 1601.20 cm-1 1942.95 cm-1 2849.21 cm-1 3001.07 cm-1 3025.61 cm-1 3059.76 cm-1 3081.98 cm-1	 1.42 cm-1 0.72 cm-1 0.22 cm-1 0.18cm-1 0.52 cm-1 0.12 cm-1 0.07 cm-1 0.11 cm-1 0.66 cm-1 0.30 cm-1 0.12 cm-1 0.32 cm-1 0.17 cm-1 0.14 cm-1	Calibrated Artefact: Matt polystyrene film Comparison against reference standards

Measured Quantity Instrument or Gauge	Range	Expanded Measurement Uncertainty (k = 2)	Remarks
RELATIVE FLUORESCENCE INTENSITY			
Concentration series of sealed liquid cells containing Quinine Sulfate solution prepared from NIST SRM 936a	Relative fluorescence intensity in the range 0.25 RFU to 1.00 RFU, dependent on concentration and integrated emission range. Integrated emission range of 375 nm to 675 nm. Solution nominal relative emission intensity: 0.25 RFU 0.50 RFU 0.75 RFU 1.00 RFU	 1.4% 1.0% 0.9% 0.8%	Comparison against reference standards
Concentration series of Solid state Starna Flourescent Orange® in 96-well plate format.	Relative fluorescence intensity in the range 0.05 RFU to 2.00 RFU with integrated emission range 520 nm to 600 nm. Material nominal relative emission intensity: 0.05 RFU 0.10 RFU 0.50 RFU 1.00 RFU 2.00 RFU	 ≤ 36.3% ≤ 17.9% ≤ 5.0% ≤ 3.2% ≤ 3.3%	Comparison against reference standards
Concentration series of solid state or sealed liquid cell fluorescent Reference Materials in cuvette, 96-well plate or other suitable physical formats.	Relative fluorescence intensity in the range 0.05 RFU to 2.00 RFU dependant on specified integrated emission range. Suitable integration range. Material nominal relative emission intensity: 0.05 RFU 0.10 RFU 0.50 RFU 1.00 RFU 2.00 RFU	 ≤ 40% * ≤ 20% * ≤ 10% * ≤ 5% * ≤ 5% *	Comparison against reference standards * approximate maximum values for full intensity range. Values will vary with material type and emission wavelength/intensity range.

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CORRECTED EMISSION SPECTRUM			
Solid state ceramic doped with Fluorescent Reference material in 96-well plate format.	Relative fluorescence intensity in the range 0.10 RFU to 1.00 RFU dependant on wavelength. Wavelength range: 650 - 749 nm	9% - 14%	Comparison against reference standards.
Suitable solid state or sealed solution cell fluorescent Reference Materials in cuvette, 96-well plate or other suitable physical formats	Relative fluorescence intensity in the range 0.10 RFU to 1.00 RFU dependant on wavelength. Wavelength range: 320 - 830 nm	≤ 15% **	Comparison against reference standards ** approximate maximum. Values will vary with material type and certified emission range.
END			

Flexible scope

The laboratory is accredited to ISO/IEC17025:2017 for calibration activities in accordance with the details listed in this schedule. This may also include calibrations on the same or similar products against standards, laboratory developed procedures or customer-specified methods, that are not specifically listed in this Schedule, providing that:

(1) The method, procedure or standard does not introduce new principles of measurement.

(2) The method, procedure or standard does not require measurements to be made outside the parametric boundaries defined in this Schedule.

Information about flexible scopes of accreditation is available in UKAS document GEN 4 and EA document EA-2/05.

Appendix - Calibration and Measurement Capabilities

Introduction

The definitive statement of the accreditation status of a calibration laboratory is the Accreditation Certificate and the associated Schedule of Accreditation. This Schedule of Accreditation is a critical document, as it defines the measurement capabilities, ranges and boundaries of the calibration activities for which the organisation holds accreditation.

Calibration and Measurement Capabilities (CMCs)

The capabilities provided by accredited calibration laboratories are described by the Calibration and Measurement Capability (CMC), which expresses the lowest measurement uncertainty that can be achieved during a calibration. If a particular device under calibration itself contributes significantly to the uncertainty (for example, if it has limited resolution or exhibits significant non-repeatability) then the uncertainty quoted on a calibration certificate will be increased to account for such factors.

The CMC is normally used to describe the uncertainty that appears in an accredited calibration laboratory's schedule of accreditation and is the uncertainty for which the laboratory has been accredited using the procedure that was the subject of assessment. The measurement uncertainty is calculated according to the procedures given in the GUM and is normally stated as an expanded uncertainty at a coverage probability of 95 %, which usually requires the use of a coverage factor of $k = 2$. An accredited laboratory is not permitted to quote an uncertainty that is smaller than the published measurement uncertainty in certificates issued under its accreditation.

Expression of CMCs - symbols and units

It should be noted that the percentage symbol (%) represents the number 0.01. In cases where the measurement uncertainty is stated as a percentage, this is to be interpreted as meaning percentage of the measurand.
Thus, for example, a measurement uncertainty of 1.5 % means $1.5 \times 0.01 \times q$, where q is the quantity value.

The notation Q[a, b] stands for the root-sum-square of the terms between brackets: $Q[a, b] = [a^2 + b^2]^{1/2}$