

CERTIFICATE OF CALIBRATION

ISSUED BY PARAGON SCIENTIFIC LIMITED

Date of Issue: Certificate No. **U3689**



Paragon Scientific Ltd

UKAS accredited calibration laboratory No. 0649 accredited to ISO/IEC 17025
UKAS accredited reference material producer No. 4589 accredited to ISO 17034

6 Prenton Way, North Cheshire Trading Estate, Prenton, Wirral, UK. CH43 3DU.

Telephone: +44 (0) 151 649 9955 Fax: +44 (0) 151 649 9977

e-mail: sales@paragon-sci.com Web Site: www.paragon-sci.com

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Approved Signatory

Name

Mr. P. Whitehurst,
Technical Director

Signature

ISO 17025 / ISO 17034 VISCOSITY AND DENSITY REFERENCE STANDARD

Standard type: **S6**

Lot No: **2201601**

Expiry Date:

Temperature		Viscosity			Density	
(°C)	(°F)	mm ² /s (cSt) Kinematic	mPa's (cP) Dynamic	SUS	SFS	(g/mL)
20.00	68.00	10.46	8.703			0.8320
25.00	77.00	8.869	7.350			0.8287
37.78	100.00	6.117	5.017			0.8202
40.00	104.00	5.772	4.725			0.8186
50.00	122.00	4.528	3.677			0.8120
60.00	140.00	3.655	2.943			0.8053
80.00	176.00	2.540	2.012			0.7920
98.89	210.00	1.913	1.491			0.7793
100.00	212.00	1.885	1.467			0.7785

Paragon Scientific Ltd. certifies that the kinematic viscosity measurements have been made in accordance with ASTM D2162 using long capillary Master Viscometers at all temperatures. See also ASTM D445, D446, D2171, ISO 3104, ISO 3105, IP 71 Sections 1 and 2 and IP 222. The viscosity data reported is based on the primary standard of pure water at 20 °C (ITS-90) having a value of 1.0034 mm²/s (cSt) ± 0.17%, as adopted by NIST, ASTM, IP and ISO (ISO 3666). Density measurements were made in accordance with ASTM D1480. Temperature measurements were made using thermometers specified in ASTM D2162 which have a current calibration traceable to the National Physical Laboratory (NPL), National Institute Standards and Technology (NIST) and other recognised national standards laboratories. SUS and SFS values have been calculated in accordance with ASTM D2161 where stated. The calibrations of this product are traceable to NIST.

Uncertainties:

Expanded Uncertainty

Viscosity Range	Kinematic Viscosity mm ² /s (cSt)	Dynamic Viscosity mPa's (cP)
0.3 to 7.4	± 0.07 %	± 0.07 %
7.4 to 10	± 0.09 %	± 0.09 %
10 to 30	± 0.12 %	± 0.12 %
30 to 72	± 0.14 %	± 0.14 %
72 to 180	± 0.15 %	± 0.15 %
180 to 520	± 0.17 %	± 0.17 %
520 to 1000	± 0.19 %	± 0.19 %
1000 to 2700	± 0.20 %	± 0.20 %
2700 to 8000	± 0.22 %	± 0.22 %
8000 to 82 500	± 0.23 %	± 0.23 %

Uncertainties stated on this certificate do not include the uncertainty for the value of the viscosity of water at 20 °C (ITS-90) having a value of 1.0034 mm²/s (cSt) ± 0.17%.

Density Uncertainties: Expanded Uncertainty ± 0.01 %

The reported expanded uncertainty is based on a combined standard uncertainty multiplied by a coverage factor of $k=2$, providing a level of confidence of approximately 95%. The evaluation has been carried out in accordance with UKAS requirements.

This CRM is intended for the calibration and/or validation of equipment used for the measurement of viscosity and density. The shelf life of this product is guaranteed until the expiry date, provided the bottle is unopened and stored at ambient temperature (15 °C to 30 °C). The guarantee is void if the bottle seal is broken. Filtration of product before use is not necessary. No minimum volume is required to guarantee homogeneity. Do not return unused product to the bottle. Follow best laboratory practise when using this product. Always keep container sealed when not in use. Follow good hygiene practice.

Units: Kinematic Viscosity: 1 cSt = 10⁻² St = 10⁻⁶ m²/s = 1 mm²/s
Dynamic Viscosity: 1 mPa's = 10⁻³ Pa's = 1 cP = 10⁻² P
Dynamic Viscosity = Kinematic Viscosity x Density (at the same temperature)

This certificate is issued in accordance with the laboratory accreditation requirements of the United Kingdom Accreditation Service (UKAS). It provides traceability of measurement to recognised national standards, and to units of measurement realised at the National Physical Laboratory (NPL) or other recognised national standards laboratories. This certificate may not be reproduced other than in full, except with the prior written approval of the issuing laboratory. UKAS is one of the signatories to the Multilateral Agreement of European co-operation for Accreditation (EA) for the mutual recognition of calibration certificates issued by accredited laboratories.

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