

The parent batch for this sample was manufactured, tested, packaged and stored on our behalf in accordance with the requirements of ISO 17025 and ISO 17034 by Paragon Scientific Ltd. The calibration certificate issued by Paragon Scientific Ltd for this product is reproduced below.



**CERTIFICATE OF CALIBRATION**  
**ISO 17025 / ISO 17034 VISCOSITY REFERENCE STANDARD**

Standard Type: **RT5000** Lot Number: **1190804** Certificate No: **FLU3411**  
 Part Number: **V12Z34** Issue Date: **11-Nov-2019** Expiry Date: **10-Nov-2021**

Temperature		Viscosity		Density
(°C)	(°F)	mm <sup>2</sup> /s (cSt) Kinematic	mPa's (cP) Dynamic	(g/mL)
20.00	68.00	5698	5513	0.9676
25.00	77.00	5167	4976	0.9631

**Paragon Scientific Ltd.** certifies that the kinematic viscosity measurements have been made in accordance with ASTM D445 using Reference Viscometers certified in accordance with ASTM D446 and ASTM D2162. 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 mm<sup>2</sup>/s (cSt) ± 0.17%, as adopted by NIST, ASTM, IP and ISO (ISO 3666). Density measurements have been made in accordance with ASTM D1480. Temperature measurements were made using thermometers specified in ASTM D445 & ASTM D1480 which have a current calibration traceable to the National Physical Laboratory (NPL), National Institute Standards and Technology (NIST) and other recognised national standards laboratories. The calibrations of this product are traceable to NIST.

**Uncertainties:**

Viscosity Range	Expanded Uncertainty	
	Kinematic Viscosity mm <sup>2</sup> /s (cSt)	Dynamic Viscosity mPa's (cP)
2 to 8	± 0.40 %	± 0.40 %
8 to 80	± 0.41 %	± 0.41 %
80 to 400	± 0.42 %	± 0.42 %
400 to 800	± 0.43 %	± 0.43 %
800 to 8000	± 0.44 %	± 0.44 %
8000 to 125000	± 0.46 %	± 0.46 %

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 mm<sup>2</sup>/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.

**Notes:** The shelf life of this product is guaranteed until the expiry date, provided the bottle is unopened and stored at ambient temperature (5 °C to 30 °C). The guarantee is void if the bottle seal is broken. Filtration of product before use is not necessary. This product has been produced according to in-house procedures and its homogeneity is guaranteed to be fit for purpose when used with a sample size appropriate for the intended measurement method.

**Units:** Kinematic Viscosity: 1 cSt = 10<sup>-2</sup> St = 10<sup>-6</sup> m<sup>2</sup>/s = 1 mm<sup>2</sup>/s  
 Dynamic Viscosity: 1 mPa's = 10<sup>-3</sup> Pa's = 1 cP = 10<sup>-2</sup> P  
 Dynamic Viscosity = Kinematic Viscosity x Density (at the same temperature)



**Approved Signatory, Mr. P. Whitehurst, Technical Director**

This certificate is issued in accordance with the laboratory accreditation requirements of the United Kingdom Accreditation Service (UKAS). It provides traceability of measurement to the SI system of units and/or to units of measurement realised at the National Physical Laboratory (NPL) or other recognised national metrology institutes. 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.

