Paragon scientific ltd

ilac-MRA

UKAS REFERENCE MATERIALS 4589

CERTIFICATE OF CALIBRATION

ISO 17025 / ISO 17034 CERTIFIED ETHANOL REFERENCE STANDARD

40 % ABV (Alcohol by Volume)

Part Number: **ETWA40** Lot Number: **6213108** Certificate No: **4132**

Issue Date: Expiry Date:

Temperature (°C)	Density in Vacuum (kg/m^3)	Density in Air (kg/m^3)	% ABV
20 °C	948.21	947.00	39.99 *

Intended Use:

This reference standard is intended for the verification of the calibration of automatic density meters used in industry to determine alcoholic strength.

Certification:

Density measurements are based on ASTM D1480 using calibrated Bingham Pycnometers. The pycnometers were calibrated at 20 °C using the HMCE density of water of 977.15 kg/m^3, rather than the generally accepted value stated in ASTM D1480.

* The alcoholic strength of this reference standard was determined according to the provisions of the United Kingdom Spirit Regulations 1991 by using the density in air at 20 °C.

The alcoholic strength was taken to be the percentage of alcohol by volume corresponding to that density from the Official Laboratory Alcohol Table[1] issued by H.M. Customs and Excise (now known as H.M Revenue & Customs).

The Laboratory Alcohol Table is based on data calculated using the general formula relating density, temperature and alcoholic strength by mass contained in Recommendation No 22 of the International Organisation of Legal Metrology (OIML)[2].

The density of air was calculated using the equation derived by Spieweck & Bettin[3].

Traceability:

Density values are traceable to ASTM D1480. Measurements are derived from and traceable to the density of water and the SI system of units through the use of balances calibrated against NPL's national standard for mass.

All temperature measurements are traceable to the International Temperature Scale 1990 and were made using thermometers with calibrations traceable to the National Physical Laboratory (NPL), the National Institute of Standards and Technology (NIST), or other recognised national standards laboratories.

Uncertainties:

Density uncertainties for the calibration of this Standard are: 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%.

Sample Care:

The shelf life of this product is guaranteed until the expiry date, provided the bottle is unopened and stored below ambient temperature (4 °C to 8 °C). The guarantee is void if the bottle seal is broken. Always keep container sealed when not in use.

Handling:

Allow the sample to reach a temperature of 18 °C to 25 °C before use. Mix well before use by inversion or gentle shaking. Follow good hygiene practice. 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.

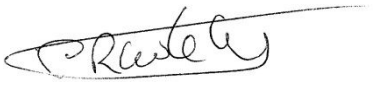
Notes:

Density in air (g/mL) = Density in vacuum (g/mL) – ρ_{air}

ρ_{air} = Density of air at known temperature and pressure.

References:

1. H.M. Customs & Excise RDC80/267/04, 1979.
2. Alcoométrie, Recommandation Internationale No 22, Bureau International de Métrologie Légale, Paris 1973
3. F. Spieweck, H. Bettin, Technisches Messen 59 (1992), 7-8, pp 285-292



Approved Signatory, Mr. P. Whitehurst, Technical Director