

**Certificate of Analysis  
Part No. B2611  
Hydrogen and Carbon in  
Titanium Pin Standard**

Certificate Number 619A  
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**% Carbon**  
**Mean = 0.008**  
**Standard Deviation =  $\pm$  0.001**  
**Expanded Uncertainty =  $\pm$  0.002**  
**(k=2, @ 95% confidence) (n=34)**

**% Hydrogen**  
**Mean = 0.0099**  
**Standard Deviation =  $\pm$  0.0004**  
**Expanded Uncertainty =  $\pm$  0.0009**  
**(k=2, @ 95% confidence) (n=45)**

Method of Analysis is ASTM E 1941-10, E 1447-09, ARI 033, and ARI 036

Primary (NMI) Standards used for traceability:

NIST SRM 2453a, 2452, 2453c, 649, 2454, 2431, 2432  
BCR 276

ALPHA – AR588-714E, AR587-215B, AR585-814E, AR589-814C, AR592-616A, AR648-1218A, AR650-718A

The intended use of this reference standard is for the calibration and validation of induction combustion, InfraRed detection (Carbon), and Thermal Conductivity (Hydrogen) detection analysers as described in the above ASTM methods. The mean analytical values were derived by separate data sets showing traceability to the above-mentioned reference standards and reported in mass fraction. The precision values represent the estimated mean value and uncertainty derived from the data sets utilizing ANOVA, ISO Guide 35, and the Guide to Uncertainty Measurement. Metrological traceability is to the SI derived unit of mass fraction expressed as percent. Refer to your test method for the expanded method derived uncertainty if needed. When necessary, professional judgment is applied toward consideration of data and statistical information.

The material used in production of this reference standard was identified in accordance with ARI 032. The samples for round robin testing were selected in accordance with ARI 014. The above values relate only to the material used to produce this standard. This bottle consists of 25g material in .25g (nominal) pins and is to be used directly from the bottle without preparation. Multiple pins may be used per test method requirements, with a minimum sample size of 1 pin. While unable to determine a definite shelf life, this reference should be reviewed every 25 years from the date of certification. Keep sealed and store under normal laboratory conditions.

This Reference Material is traceable to the above-mentioned reference materials. For good laboratory practice, it is recommended that all standards be verified as fit for purpose prior to use. Remedies for any claimed defect in this product will be limited to product replacement or refund of the purchase price. In no event, shall Elemental Microanalysis Ltd be liable for incidental or consequential damages. This certificate cannot be reproduced except in full.

Certified December 18, 2019

Elemental Microanalysis Ltd