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Certificate Number 919A  
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**% Carbon**  
**Mean = 3.32**  
**Standard Deviation = ± 0.03**  
**Expanded Uncertainty = ± 0.06**  
**(k=2, @ 95% confidence, n=46)**

**% Sulphur**  
**Mean = 0.034**  
**Standard Deviation = ± 0.001**  
**Expanded Uncertainty = ± 0.003**  
**(k=2, @ 95% confidence, n=34)**

Method of analysis is ASTM E1019-18 and ARI 033  
Primary (NMI)/Guide 34/ISO 17034 Standards Employed:  
NIST 388, 4L, 107c, 73c  
CTIF FB-10  
NCS NS11011  
BAS 481-1  
ALPHA AR322-1015B, AR303-218A, AR309-219D, AR306-817B,  
AR322-1011A, AR300-1012A, AR318-1015C, AR322-071602

#### Notes

The intended use of this reference standard is for the calibration and continued quality validation of Carbon and Sulphur in induction combustion, IR detection systems as described in ASTM E1019. The mean analytical values were derived from data sets showing traceability to the above mentioned NMI standards and reported in mass fraction. The precision values represent the estimated mean, standard deviation, and expanded uncertainty derived from the data sets, using ISO Guide 35, ANOVA, and the Guide to Uncertainty Measurement. The analytical sample test size used was 0.3-0.5g nominal as suggested by the instrument manufacturer(s). The minimum sample size is subject to the ASTM test method and detection capability of your analyser. 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 was identified in accordance with ARI 032. The samples for round robin style testing were selected in accordance with ARI 014. The above values relate only to the material used to produce this reference standard. This bottle contains 250g, cast iron powder, to be used directly from the bottle with no preparation needed. While unable to determine a definite shelf life, this reference should be reviewed every 25 years from date of certification. Keep sealed and store under normal laboratory conditions.

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.

This Reference Material is traceable to the above-mentioned standards. For good laboratory practice, it is recommended that all standards be verified as fit for purpose prior to use.

Elemental Microanalysis Limited

Certified December 23, 2019