



Certificate of Analysis

AR 872

CARBON STEEL RING REFERENCE STANDARD

LOT # 119C

% CARBON

MEAN = 0.160

Standard Deviation = ± 0.001

Expanded Uncertainty = ± 0.003

(k=2, @ 95% confidence limit) (n=40)

% SULFUR

MEAN = 0.0219

Standard Deviation = ± 0.0010

Expanded Uncertainty = ± 0.0023

(k=2, @ 95% confidence limit) (n=38)

Method of Analysis is ASTM E1019-18 and ARI 033

Primary (NMI)/Guide 34 Reference Standards Employed:

NIST SRM 133b, 32e, 129c, 337a, 19h, 106b

JSS 030-8, 057-9

EURO CRM232/2, 084-1, 227-1

NCS HC11111

ALPHA - AR872-317C, AR872-714G, AR871-314A

The intended use of this reference standard is for the calibration and verification of induction combustion Carbon/Sulfur analysis by infra-red detection as described by ASTM E1019. The mean analytical values were derived by 4 data sets showing traceability to the above-mentioned primary reference standards and reported in mass fraction. The minimum and typical size for testing was 1g (1 ring) per ASTM E1019. The precision values represent the mean value and estimated uncertainty derived from the data sets utilizing ANOVA, ISO Guide 35 and the Guide to Uncertainty Measurement. Refer to your test method for additional uncertainty information. When necessary, professional judgment is applied toward consideration of data and statistical information. The statistical analysis and the overall direction and coordination of the analytical measurements leading to certification were performed by K.E. Dyer, Chief Chemist, at Alpha Resources.

The material used in production of this standard 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 standard. This bottle contains 454g, 1g rings (nominal weight), to be used directly from the bottle with no preparation needed. While unable to determine a definite shelf life this reference should be reviewed 25 years after 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 Alpha Resources be liable for incidental or consequential damages. This certificate cannot be reproduced except in full. Produced in accordance to ISO Guide 31 and ISO 17034.

This is a Certified Reference Material and 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. These test results are accredited under the Alpha Resources LLC. laboratory's ISO/IEC 17025 and ISO 17034 (RMP) accreditation issued by ANSI-ASQ/ANAB. Refer to certificate and scope of accreditation(s) AT-1200 and AR-1920.

Certified March 7, 2019

Chief Chemist