



## Certificate of Analysis

AR 871

LOW CARBON STEEL RING CRM

LOT # 521M

**% CARBON**

MEAN = 0.036

Standard Deviation =  $\pm 0.001$

Expanded Uncertainty =  $\pm 0.003$

(k=2, @ 95% confidence limit) (n=43)

**% SULFUR**

MEAN = 0.015

Standard Deviation =  $\pm 0.001$

Expanded Uncertainty =  $\pm 0.003$

(k=2, @ 95% confidence limit) (n=44)

Method of Analysis is ASTM E1019-18 and ARI-LAB-621

Primary (NMI)/ISO17034 Reference Materials Employed:

NIST SRM 123c, 345b, 2160, 125b, 348a, 2159

BAM 289-1, 227-1

ALPHA – AR871-119A, AR871-218D, AR871-716A, AR872-119C, AR890-104923A97, AR871-111A, AR870-819A, AR871-314A, AR869-708917409, AR891-1652904

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 data sets showing traceability to the above-mentioned 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. Metrological traceability is to the SI derived unit of mass fraction expressed as percent. 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-LAB-603. The samples for round robin style testing were selected in accordance with ARI-LAB-625. 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 with 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 November 8, 2021

Chief Chemist