



Certificate of Analysis

AR 660

OXYGEN & NITROGEN STEEL PIN STANDARD

LOT # 1018A

% OXYGEN

MEAN = 0.0040

Standard Deviation = \pm 0.0005

Expanded Uncertainty = \pm 0.0011

(k=2, @ 95% confidence, n=50)

% NITROGEN

MEAN = 0.0074

Standard Deviation = \pm 0.0003

Expanded Uncertainty = \pm 0.0007

(k=2, @ 95% confidence, n=48)

Method of Analysis is ASTM E 1019-18, and ARI 034

Primary (NMI) Standards Employed:

NIST 12h, 1099

NCS NS11037, NS20035b, NS21006

ALPHA - AR660-317B, AR668-1014B, AR661-517C, AR654-914G, AR656-314E, AR657-916A, AR660-1014D, AR656-618A, AR656-312B

This steel pin reference standard is intended to be a calibration or QC validation of Oxygen and Nitrogen on inert gas fusion analyzers utilizing infrared and thermal conductivity detection as described in ASTM E1019. The analytical sample and minimum size used for testing was 1 pin (0.5g nominal). 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. Refer to your test method and or your instrument manufacturer for the expanded method derived uncertainty. 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 testing were selected in accordance with ARI 014. The above values relate only to the material used to produce this reference standard. This reference contains 50g, 0.5g pins (nominal), to be used directly from the bottle with no preparation. 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 was produced in accordance to ISO 17034 and ISO Guide 31.

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.

This is a CRM and is traceable to the above-mentioned standards. For good laboratory practice, it is recommended that all standards be verified fit for purpose prior to use. These test results are accredited under the Alpha Resources LLC laboratory's ISO/IEC 17025 and ISO 17034 accreditation (RMP) issued by ANSI-ASQ/ANAB. Refer to certificate and scope of accreditation(s) AT-1200 and AR-1920.

Certified April 24, 2019

Chief Chemist