



# Certificate of Analysis

AR 555

HYDROGEN IN STEEL REFERENCE

LOT # 219C

TOTAL HYDROGEN (melted/fused)  
MEAN VALUE = 2.3 (ug/g) (0.00023 wt. %)  
STANDARD DEVIATION = 0.4 (ug/g) ( $\pm$  0.00004 wt. %)  
EXPANDED UNCERTAINTY = 1.1 (ug/g) ( $\pm$  0.00011 wt. %)  
(Expanded uncertainty  $k=2$ , @ 95% confidence,  $n=36$ )

Method of Analysis:

LECO RH-404 Inert Gas Fusion, TC Detection - ARI-036

Reference materials used for certification:

NCS	NS20025b
JSS	GS-7a, GS 9-1
BAM	Stahl H1

ALPHA - AR556-916E, AR555-1013A, AR546-917C, AR546-512B, AR556-517A

Notes:

The intended use of this reference standard is for the calibration and continued quality verification of hydrogen in steel by inert gas fusion (fully melted), using thermal conductivity detection analysis. The precision values represent the standard deviation and expanded uncertainty ( $k=2$ , @ 95% confidence), utilizing Guide to Uncertainty Management, ISO Guide 35, and ANOVA. This standard was produced in accordance to ISO Guide 31 and ISO 17034.

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. This standard is intended only to be used for Hydrogen gas analysis of steel and minimum/typical sample size is 1g. The above values relate only to the material used to produce this standard. The statistical analysis, overall direction, and coordination of the analytical measurements leading to certification were performed by K. E. Dyer Chief Chemist at Alpha Resources Inc. This bottle contains 100, 1g pins (nominal), to be used directly from the bottle. While unable to determine a definite shelf life this reference should be reviewed 25 years from the 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.

This is a Certified Reference Material (CRM), and 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. 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