



Certificate of Analysis

AR 555

HYDROGEN IN STEEL CRM

LOT # 1021M

TOTAL HYDROGEN (melted/fused)
MEAN VALUE = 2.5 (ug/g) (0.00025 wt. %)
STANDARD DEVIATION = ± 0.5 (ug/g) (± 0.00005 wt. %)
EXPANDED UNCERTAINTY = ± 1.0 (ug/g) (± 0.0001 wt. %)
(Expanded uncertainty $k=2$, @ 95% confidence, $n=50$)

Method of Analysis:

Inert Gas Fusion Thermal Conductivity Detection, and InfraRed Detection – ARI-LAB-623

Reference materials used for certification:

NCS	NS20042, NS20025b
JSS	SS-5-36, JSM 481-2, KMS-H6, KMS-H4, KMS-H2b
BAM	STAHL H1

ALPHA – AR555-219C, AR555-1013A, AR556-812C, AR556-916E, AR556-517A

Notes:

The intended use of this reference material is for the calibration and continued quality verification of hydrogen in steel by inert gas fusion (fully melted), using thermal conductivity or infrared detection analysis. The analytical data is reported as a mass fraction and in weight percent. The precision values represent the standard deviation and expanded uncertainty ($k=2$, @ 95% confidence), utilizing Guide to Uncertainty Management, ISO Guide 35, and ANOVA. Metrological traceability is to the SI derived unit of mass fraction expressed as percent or ug/g. This reference material was produced in accordance with ISO Guide 31 and ISO 17034. Your test methods may not meet the capabilities of this reference, refer to your test method or instrument manufacturer for additional uncertainty information.

The material used in production of this standard was identified in accordance with ARI-LAB-603. The samples for round robin testing were selected in accordance with ARI-LAB-625. This reference is intended only to be used for Hydrogen gas analysis of steel with a minimum/typical sample size of 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 September 1, 2022

Kent Dyer
Chief Chemist