

Analytical Reference Materials International

Certificate of Analysis Certified Reference Material



Grade: $1\frac{1}{4}\text{Cr } \frac{1}{2}\text{Mo}$ / UNS K11572

Part Number (Q.A. NO.): IARM 35H

Certificate Date: 01/11/2007

Certificate No.: 35H-01112007-IARM-F

Revision Date: 09/16/2010

Interpretation of Data

1. Certified values listed below reflect analysis results submitted by qualified analytical laboratories using a combination of methods and instrumentation that emulate actual methods and instrumental techniques currently utilized in the analytical community and are reported as % wt. unless otherwise noted.
2. Any data reported and enclosed by a **parentheses ()** is a "best estimate" and is **NOT CERTIFIED**. This data could not be quantified sufficiently for certification. It was however, reported by enough laboratories to be considered as potentially present in the matrix of the material being examined.
3. The "Inter-laboratory Analysis Program" (ILAP) utilized in the establishment of the data are an ongoing program with permanent membership. Certain elements may be selected by a consensus of the members for more extensive testing. Therefore the data in **brackets []** indicates further testing is in process.
4. The "**±Estimated Uncertainty**" is enclosed by a **parentheses ()** below the individual **element's concentration** and is based on a Confidence Interval at 95%. Included in this estimated uncertainty, are the combined effects of method imprecision, material inhomogeneity, and any bias between methods.

Important: A "User Registration Card" accompanies all shipments. This card should be completed immediately upon receipt of materials with the appropriate user information. This is the only way in which ARMI can guarantee customer updates or possible data modifications!

<u>Aluminum</u>	<u>Antimony</u>	<u>Arsenic</u>	<u>Boron</u>	<u>Calcium</u>	<u>Carbon</u>	<u>Chromium</u>	<u>Cobalt</u>
0.028 (0.001)	0.002 (0.001)	0.003 (0.0004)	0.0003 (0.0001)	(0.0003)	0.135 (0.002)	1.11 (0.01)	0.004 (0.001)
<u>Copper</u>	<u>Lead</u>	<u>Manganese</u>	<u>Molybdenum</u>	<u>Nickel</u>	<u>Niobium</u>	<u>Nitrogen</u>	<u>Oxygen</u>
0.033 (0.001)	0.0009 (0.0002)	0.56 (0.003)	0.47 (0.003)	0.071 (0.001)	0.002 (0.0003)	0.0075 (0.0001)	0.002 (0.0004)
<u>Phosphorus</u>	<u>Sulfur</u>	<u>Silicon</u>	<u>Tin</u>	<u>Titanium</u>	<u>Tungsten</u>	<u>Vanadium</u>	<u>Zirconium</u>
0.005 (0.0003)	0.028 (0.001)	0.56 (0.01)	0.002 (0.0003)	0.0016 (0.0002)	0.004 (0.001)	0.004 (0.0003)	0.001 (0.0002)

The laboratories participating in the "Inter-Laboratory Analysis Program" (ILAP) and certification of this material are as follows:

AK Steel, Middletown Works - Middletown, OH	Anderson Laboratories, Inc. - Greendale, WI	ATI Allvac, Lockport - Lockport, NY
ATI Powder Metals - Pittsburgh, PA	Cannon Muskegon Corp. - Muskegon, MI	Carpenter Technology Corporation - Reading, PA
Colonial Metals Co. - Columbia, PA	Crucible Industries LLC - Syracuse, NY	Deloro Stellite, Inc. - Belleville, ON
Ellwood National Steel - Irvine, PA	Ellwood Quality Steel - New Castle, PA	Essar Steel Algoma, Inc. - Sault Ste. Marie, ON
Exova - Gary, IN	Exova - Glendale Heights, IL	Exova - Los Angeles, CA
Exova - Portland, OR	IMR Test Labs - Lansing, NY	Jorgensen Forge Corp. - Seattle, WA
Kalco Metals, Inc - Wheatland, PA	Laboratory Testing, Inc. - Hatfield, PA	Lockheed Martin Astronautics - Littleton, CO
MetalTek International, Inc. - Waukesha, WI	MSI Testing & Engineering, Inc. - Melrose Park, IL	Outokumpu Stainless OY - Tormio Finland
Severstal North America, Inc. - Mingo Junction, OH	Special Metals IncoTest - Hereford, UK	Stork Material Testing & Insp. - Huntington Beach, CA
Tensile Testing - Cuyahoga Hts., OH	The Timken Company - Canton, OH	TMK IPSCO - Koppel, PA

Traceability: All members of the "Inter-Laboratory Analysis Program" (ILAP) listed above validate test methods and instrument performance utilizing SRMs produced by the National Institute of Standards and Technology, (NIST) as well as other CRMs and RMs produced by recognized Certifying Bodies from around the world. The specific SRMs, CRMs, and RMs applicable to the material covered by this certificate are: IARM 35A, 38A, ALPHA AR872, NIST 1262A, 1264A, BS 60C, 61C, 68C, 1962, 2941, 3941, 4931, CSN3, LECO 502-256, NIST 1263, 1264, BAS 410/1, 431/1, 458/1, IARM 30A, BS 57E, 61C, 68B, NIST 361, IARM 35C, BS 2-1, LECO 501-643, 501-644, BS 3941, IARM 35A, 35B, LECO 501-501, 501-510, 501-550, NIST 1262A, IARM 35C, LECO 501-677, NIST 1261A, 1263A, ALPHA AR873, LECO 501-550, IARM 35A, 35B, 35C, 35D, LECO 501-503, 501-550, IARM 35C, LECO 501-643, BCS 409, 351, 454/1, 462/1, LECO 501-551, 502-102, R5657, NIST 1263, IARM 30C, 40B, 143B, EURO 077-1, NR 2D, MBH 15255, NIST 1263A, 1763, BS 12D, 46, ALPHA AR872, AR890, LECO 501-550, IARM 27D, 35A, 35D, ES 0115A, LECO 502-188, 502-257, NIST 1761, 1762, 1763, 1764, 1765, 1766, 1767, NIST 8J, 345A, 1761, 1762, 1763, 1764, 1765, 1766, 1767, 2168, IARM 35B, 36B, AK597, A10, NIST 1217, 1225, 1763, NIST 1166, 1263, 1265, 1765, BCS SS456, BS 45, 61D, 3931, 4620, XCCS, 12X12749, ALPHA AR 1653, LECO 501-644, 501-676, IARM 35E, 35F, BS 4942, ALPHA AR660, AR872, NIST 293, 337A, 361, 1160, 1161, 1162, 1163, 1164, 1754, 1760, 1761, 1762, 1763, 1764, 1765, 1766, 1767, BAS 401/1, 402/1, 403/1, 404/1, 405/1, 406/1, 407/2, 408/1, 409/1, 410/2, JSS ST01, IARM 31D, LECO 501-510, 501-645, SUS INOX, RE 12/19, C/17, D/18, BS CSN-3, CSN-4, LECO 501-871, NIST 1286, IARM 30B, NIST 1762, 1766, BS 45, 46A, 47A, LECO 501-503, 501-505, 501-643, 501-644, VHG TALN-500, TCRN 43/04N, PCUN 41/04N, TMNN 33/04N, TMONF 502-300, PNIN 510-0663, PSNIF 510-0272, PSNNF 508-0467, PTINF 505-0227, PVN 44/05N, PWW 502-0244, 623-2702, LECO 501-501, 501-551, 501-553, 501-645, 501-674, 502-064, NIST 1261A, 1262A, 1263A, 1264A, 1265A, 1760, 1761, 1762, 1763, 1764, 1765, 1766, 1767, LECO 501-550, NIST 361, 362, 363, IARM 42B, LECO 501-644.

A specific line of traceability is established to NIST and other Certifying Bodies for those elements that are noted as "Certified Values" on the Certificates of Analyses referenced above.

See Reverse Side for Statistical Data and Additional Information Regarding this Material.

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