National Institute of Standards and Technology
U.S. Department of Commerce

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Standard Reference Material® 1762b

Low Alloy Steel

(disk form)

CERTIFICATE OF ANALYSIS

Purpose: The certified values delivered by this Standard Reference Material (SRM) are intended primarily for use in validation of chemical and instrumental methods of analysis for element contents of iron and steel alloys. They can be used to validate value assignment of a laboratory's in-house reference materials.

Description: A unit of SRM 1762b consists of one disk approximately 34 mm in diameter and 19 mm thick.

Certified Values: A NIST certified value is the present best estimate of the true value [1]. The certified values for SRM 1762b are shown in the table below and are metrologically traceable to the International System of Units (SI) derived unit of mass fraction, expressed as percent.

Certified Values for Elements in SRM 1762b

Element	Mass Fraction[(a)] (%)	Element	Mass Fraction[(a)] (%)
Aluminum (Al)	0.0697 ± 0.0014	Niobium (Nb)	0.0739 ± 0.0032
Arsenic (As)	0.0173 ± 0.0014	Phosphorus (P)	0.0374 ± 0.0028
Boron (B)	0.00430 ± 0.00092	Silicon (Si)	0.3430 ± 0.0059
Carbon (C)	0.3582 ± 0.0099	Sulfur (S)	0.0318 ± 0.0038
Cobalt (Co)	0.06120 ± 0.00096	Tantalum (Ta)	0.0209 ± 0.0023
Chromium (Cr)	0.932 ± 0.020	Tin (Sn)	0.0479 ± 0.0018
Copper (Cu)	0.12014 ± 0.00093	Titanium (Ti)	0.0967 ± 0.0027
Manganese (Mn)	1.997 ± 0.084	Vanadium (V)	0.19992± 0.00063
Molybdenum (Mo)	0.348 ± 0.011	Zirconium (Zr)	0.0298 ± 0.0013
Nickel (Ni)	1.170 ± 0.022		

[(a)] Values are expressed as $x \pm U_{95\%}(x)$, where x is the certified value and $U_{95\%}(x)$ is the expanded uncertainty of the certified value [2–4]. The true value of the analyte lies within the interval $x \pm U_{95\%}(x)$ with 95 % confidence. For guidance in propagating this uncertainty, see reference 4.

Period of Validity: The certification of **SRM 1762b** is valid indefinitely, within the measurement uncertainty specified, provided the SRM is handled and stored in accordance with instructions given in this certificate. Periodic recertification of this SRM is not required. The certification is nullified if the SRM is damaged, contaminated, or otherwise modified.

Maintenance of Certified Values: NIST will monitor this SRM over the period of its validity. If substantive technical changes occur that affect the certification, NIST will notify the purchaser. Registration (see attached sheet or register online) will facilitate notification.

Other Information: Approximate mass fraction values for elements determined by single methods are provided in Appendix A.

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Storage: Store the SRM in its original container in a dry location at room temperature.

Use: The test surface is the side opposite to the labeled surface, which includes the SRM number. The certified values are valid for the entire thickness of the unit. However, the user is cautioned not to measure disks less than 2 mm thick when using X-ray fluorescence spectrometry. Each packaged disk has been prepared by finishing the test surface using a milling machine. The user must determine the correct surface preparation procedure for each analytical technique. The user is cautioned to use care when either resurfacing the disk or performing additional polishing as these processes may contaminate the surface. It was found by NIST that abrasive paper must be changed frequently during surface grinding. Used paper loses its ability to remove contaminants from the surface of the steel.

Source: The material for SRM 1762b was obtained from a commercial manufacturer of low alloy steel. The material was cleaned, sliced, labeled and packaged at NIST.

Analysis: Homogeneity testing of the material for SRM 1762b was performed at NIST. Measurements used to certify SRM 1762b were performed at NIST and a collaborating laboratory. This material was tested using both the solid disks and chips prepared from the disks. Test methods included combustion with infrared detection, inductively coupled plasma optical emission spectrometry, inert gas fusion, prompt gamma-ray activation analysis, and X-ray spectrometry.

Notice to Users: NIST strives to maintain the SRM inventory supply, but NIST cannot guarantee the continued or continuous supply of any specific SRM. Accordingly, NIST encourages the use of this SRM as a primary benchmark for the quality and accuracy of the user's in-house reference materials and working standards. As such, the SRM should be used to validate the more routinely used reference materials in a laboratory. Comparisons between the SRM and in-house reference materials or working measurement standards should take place at intervals appropriate to the conservation of the SRM and the stability of relevant in-house materials. For further guidance on how this approach can be implemented, contact NIST by email at srms@nist.gov.

REFERENCES

[1] Beauchamp, C.R.; Camara, J.E.; Carney, J.; Choquette, S.J.; Cole, K.D.; DeRose, P.C.; Duewer, D.L.; Epstein, M.S.; Kline, M.C.; Lippa, K.A.; Lucon, E.; Phinney, K.W.; Polakoski, M.; Possolo, A.; Sharpless, K.E.; Sieber, J.R.; Toman, B.; Winchester, M.R.; Windover, D.; *Metrological Tools for the Reference Materials and Reference Instruments of the NIST Material Measurement Laboratory*; NIST Special Publication (NIST SP) 260-136; U.S. Government Printing Office: Washington, DC (2020); available at https://nvlpubs.nist.gov/nistpubs/SpecialPublications/NIST.SP.260-136-2020.pdf (accessed Apr 2021).

[2] Efron, B.; Tibshirani, R.J.; *An Introduction to the Bootstrap*; Chapman & Hall: London, UK (1993).

[3] Searle, S.R.; Casella, G.; McCulloch, C.E.; *Variance Components*; John Wiley: Hoboken, NJ (1992).

[4] Possolo, A.M.; *Evaluating, Expressing, and Propagating Measurement Uncertainty for NIST Reference Materials*; NIST SP 260-202; U.S. Government Printing Office: Washington, DC (2020); available at https://nvlpubs.nist.gov/nistpubs/SpecialPublications/NIST.SP.260-202.pdf (accessed Apr 2021).

Certain commercial equipment, instruments, or materials may be identified in this Certificate of Analysis to adequately specify the experimental procedure. Such identification does not imply recommendation or endorsement by the National Institute of Standards and Technology, nor does it imply that the materials or equipment identified are necessarily the best available for the purpose.

Users of this SRM should ensure that the Certificate of Analysis in their possession is current. This can be accomplished by contacting the Office of Reference Materials 100 Bureau Drive, Stop 2300, Gaithersburg, Maryland 20899-2300; telephone (301) 975-2200; e-mail srminfo@nist.gov; or the Internet at https://www.nist.gov/srm.

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APPENDIX A

Other Information

Approximate mass fraction values for additional elements in SRM 1762b were each obtained by one test method. The values have not been confirmed nor have the uncertainties of the values been assessed. This information is provided to help the user assess possible measurement interferences. It cannot be used to establish metrological traceability to the International System of Units or another higher-order reference system. Do not use these values to calibrate or to validate a test method.

Element	Mass Fraction (%)
Iron (Fe)	94.3
Nitrogen (N)	0.002
Tungsten (W)	0.002

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