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

Date of Issue:
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Standard Reference Material® 2098
Super-High-Energy Charpy V-Notch Specimens

(NIST-Verification, 8 mm Striker)

CERTIFICATE

Purpose: The certified value delivered by this Standard Reference Material (SRM) is intended for the indirect verification of Charpy machines equipped with an 8 mm striker, in accordance with the current ASTM Standard E23 [1] and the current ISO Standard 148-2 [2].

Description: A unit of SRM 2098 consists of a set of Charpy specimens needed to perform a single indirect verification. SRM 2098 is made from 4340 alloy steel. The bars are finished to length, heat-treated, and machined in SRM specimen lots ranging in size from 1200 to 2000 specimens. Each specimen has a lot number and an identification number (three or four digits).

Certified Value: Specimens from each SRM lot are certified by the NIST Applied Chemicals and Materials Division on Charpy reference machines. These data are statistically evaluated to ensure the homogeneity of the lot, establish the certified value, and determine the number of SRM specimens required for a user to perform a valid verification. A NIST certified value, as used within the context of this certificate, is a value for which NIST has the highest confidence in its accuracy, in that all known or suspected sources of bias have been investigated or taken into account [3,4]. The measurand is absorbed energy as measured by the NIST Charpy reference machines. Traceability is to the International System of Units (SI) unit joule (J).

The certified value of the SRM is not given on this portion of the certificate. The certified value and the uncertainty associated with it are given in the verification report that is issued by NIST following the verification test (see "Verification of the User's Machine"). If a certified value is required immediately after testing, you can contact the NIST Charpy Program Coordinator as follows: telephone (303) 497-3351; fax (303) 497-5939; or e-mail charpy@nist.gov. The lot number, machine serial number, and absorbed energy results of the tested specimens must be provided in order to obtain certified values.

Period of Validity: The certified value and uncertainty furnished in the verification report are valid indefinitely. The certified value is nullified if the material is stored or used improperly, damaged, contaminated, or otherwise modified. The successful verification of an acceptable machine is valid for a maximum of one year from the date on which this SRM was tested. If a user's machine is moved or undergoes any major repairs or adjustments, the current verification will be invalidated, and the machine must be reverified.

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 issue an amended certificate through the NIST SRM website (https://www.nist.gov/srm) and notify registered users. SRM users can register online from a link available on the NIST SRM website or fill out the user registration form that is supplied with the SRM. Registration will facilitate notification. Before making use of any of the values delivered by this material, users should verify they have the most recent version of this documentation, available through the NIST SRM website (https://www.nist.gov/srm).

John D. Perkins, Chief
Applied Chemicals and Materials Division

Steven J. Choquette, Director
Office of Reference Materials

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Storage: The SRMs are anticipated to have an indefinite shelf life under normal storage conditions (20 °C ± 20 °C, ≤50 % relative humidity).

Use: The protective oil coating should be wiped from each specimen with a lint-free cloth just prior to testing. Prior to indirectly verifying a Charpy machine equipped with an 8 mm striker, the machine should be checked to ensure compliance with the appropriate sections of the applicable ASTM or ISO Standard. SRM 2098 shall be tested at 21 °C ± 3 °C (70 °F ± 6 °F), in accordance with the applicable standard (ASTM or ISO). The energy level of the SRM appropriate for verifying the performance of a particular Charpy impact machine can be determined by considering the energy range that should be expected for the SRM, the maximum capacity of the machine, and the requirements of the applicable test method (ASTM or ISO). The certified energy of SRM 2092 specimens is typically within the range of 175 J to 240 J. This SRM cannot be used to verify a Charpy machine equipped with a 2 mm striker.

Notice to Clean Anvils After Testing

The steel currently used by NIST for the production of Super-High-Energy Charpy Specimens tends to leave debris on the machine anvils when the specimen is dragged by the swinging hammer. Therefore, it's **extremely important to accurately clean the anvils after each test, by scraping them with a razor blade or a similar sharp tool**, until both anvils feel "smooth" to the finger. If anvils are not properly cleaned, absorbed energy may be artificially increased due to excessive friction, and the machine may fail its indirect verification at the super-high-energy level.

NOTE: In most cases, super-high-energy specimens will not fracture completely when tested.

Verification of User's Machine: The NIST Charpy Program Coordinator will issue a verification report of findings to the user's facility upon electronic receipt of the completed questionnaire and of digital pictures of the tested specimens. Completed questionnaires and digital pictures should be emailed to the NIST Charpy Program Coordinator, charpy@nist.gov. This is the recommended procedure. Detailed instructions are included in the attached questionnaire. However, if returning broken specimens to NIST is preferred, a plastic, self-locking bag is provided. The broken specimens shall be taped together as described in the wrapping instructions included with the questionnaire. The verification report is considered to be the second part of this certificate and includes the certified value and uncertainty of the SRM.

Shipping Information: Shipping charges for the return of broken specimens are the responsibility of the user. The mailing label provided with each SRM must be used to expedite shipping and, for overseas shipments, clearance by U.S. Customs.

Note to International Customers: If return of broken specimens to NIST is preferred, regular overseas shipments of broken specimens should be sent airmail so that after they are cleared by U.S. Customs, they can be forwarded directly to NIST-Boulder. If a more rapid shipping mode is necessary, choose an overnight delivery service that will handle U.S. Customs clearance **AND** will deliver directly to NIST-Boulder. Unless such delivery is assured, air freight packages may be returned to the customer by U.S. Customs.

REFERENCES

[1] ASTM E23; *Standard Test Methods for Notched Bar Impact Testing of Metallic Materials*; Annual Book of ASTM Standards, Vol. 03.01; ASTM: West Conshohocken, PA.

[2] ISO 148-2; *Metallic Materials − Charpy Pendulum Impact Test − Part 2: Verification of Testing Machines;* International Organization for Standardization: Geneva, Switzerland (2016).

[3] 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.; Molloy, J.; Nelson, M.A.; Phinney, K.W.; Polakoski, M.; Possolo, A.; Sander, L.C.; Schiel, J.E.; Sharpless, K.E.; 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, 2021 edition; U.S. Government Printing Office: Washington, DC (2021); available at https://nvlpubs.nist.gov/nistpubs/SpecialPublications/NIST.SP.260-136-2021.pdf (accessed Oct 2023).

[4] JCGM 200:2012; *International Vocabulary of Metrology — Basic and General Concepts and Associated Terms (VIM)*, 3rd ed.; JCGM (2012); available at https://www.bipm.org/en/publications/guides (accessed Oct 2023).

Certificate Revision History: 27 October 2023 (Editorial changes); 08 June 2023 (Editorial changes); 24 October 2022 (Cleaning after testing notice added; editorial changes); 20 January 2022 (Update format; editorial changes); 14 July 2020 (Editorial changes); 06 September 2019 (Title updated; editorial changes); 20 December 2013 (Editorial changes); 13 June 2013 (Lot number removed from title; editorial changes); 25 January 1991 (Original SRM lot certificate date).

Certain commercial equipment, instruments, or materials may be identified in this Certificate 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 in their possession is current. This can be accomplished by contacting the Office of Reference Materials 100 Bureau Drive, Stop 2300, Gaithersburg, MD 20899-2300; telephone (301) 975-2200; e-mail srminfo@nist.gov; or the Internet at https://www.nist.gov/srm.

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