

**QUESTIONNAIRE FOR CHARPY IMPACT MACHINE VERIFICATION**

**IMPORTANT:** This questionnaire contains information to help you perform a successful verification test. Energy results are required for verification. Other specific information is requested to help evaluate the condition of your machine. The questionnaire and the fractured specimens should be shipped to the Charpy Program Coordinator, NIST, Division 853, 325 Broadway, Boulder, CO 80305-3328. Phone: 303/497-3351 Fax: 303/497-5939.

**Location of Machine**

Company \_\_\_\_\_

Address \_\_\_\_\_

\_\_\_\_\_

City \_\_\_\_\_ State or Province \_\_\_\_\_

Country \_\_\_\_\_ Zip or Postal Code \_\_\_\_\_

**Mailing Address for Verification Letter (if different from above)**

Company \_\_\_\_\_

Address \_\_\_\_\_

\_\_\_\_\_

City \_\_\_\_\_ State or Province \_\_\_\_\_

Country \_\_\_\_\_ Zip or Postal Code \_\_\_\_\_

**Test Machine (Circle appropriate units where indicated)**

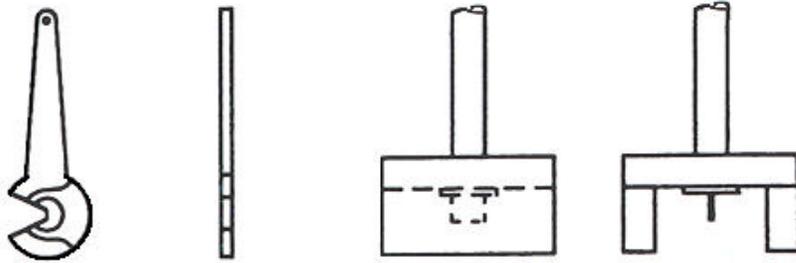
1. Machine Manufacturer and Serial Number \_\_\_\_\_
2. What is the maximum energy capacity of the machine? \_\_\_\_\_ Joules ft-lbf
3. If the machine is adjustable, what capacity was used for this test? \_\_\_\_\_ Joules ft-lbf
4. The machine should be securely bolted to a concrete foundation or a steel block having a mass not less than 40 times that of the pendulum.
  - (a) What types of bolts are used to mount the machine? (i.e., J, lag, etc.) \_\_\_\_\_
  - (b) The machine should be level according to the current ASTM Standard E 23.
5. Is your machine equipped with a carbide striker?    Yes    No
6. Is your machine equipped with carbide anvils?        Yes    No

7. Check the appropriate pendulum design below.

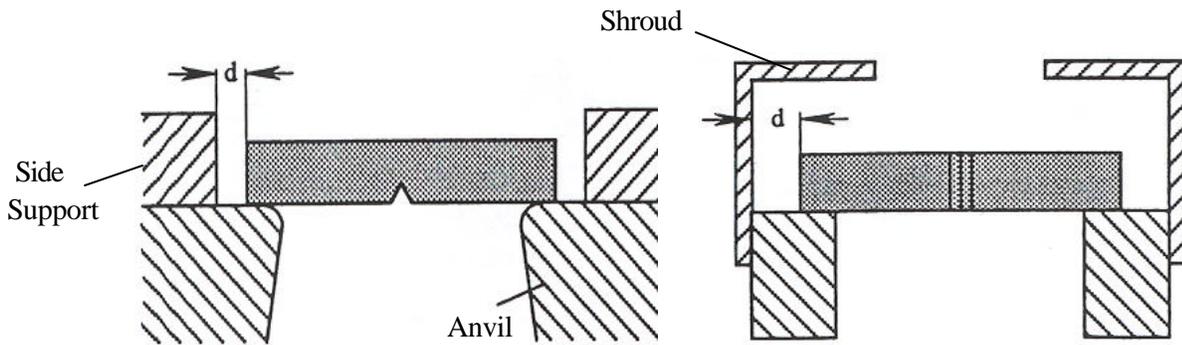
(A) \_\_\_\_\_

(B) \_\_\_\_\_

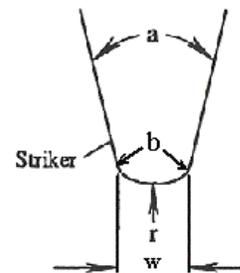
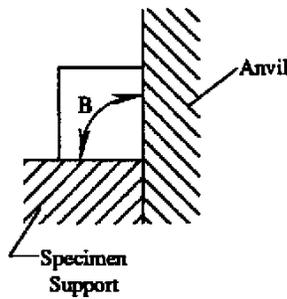
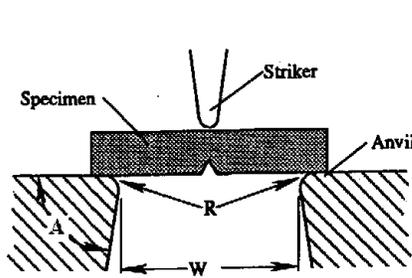
(C) Sketch below \_\_\_\_\_



8. If side supports or shrouds are used, what is dimension "d"? \_\_\_\_\_ mm in.



9. Your anvils and striker should conform to the dimensions below:



Anvils

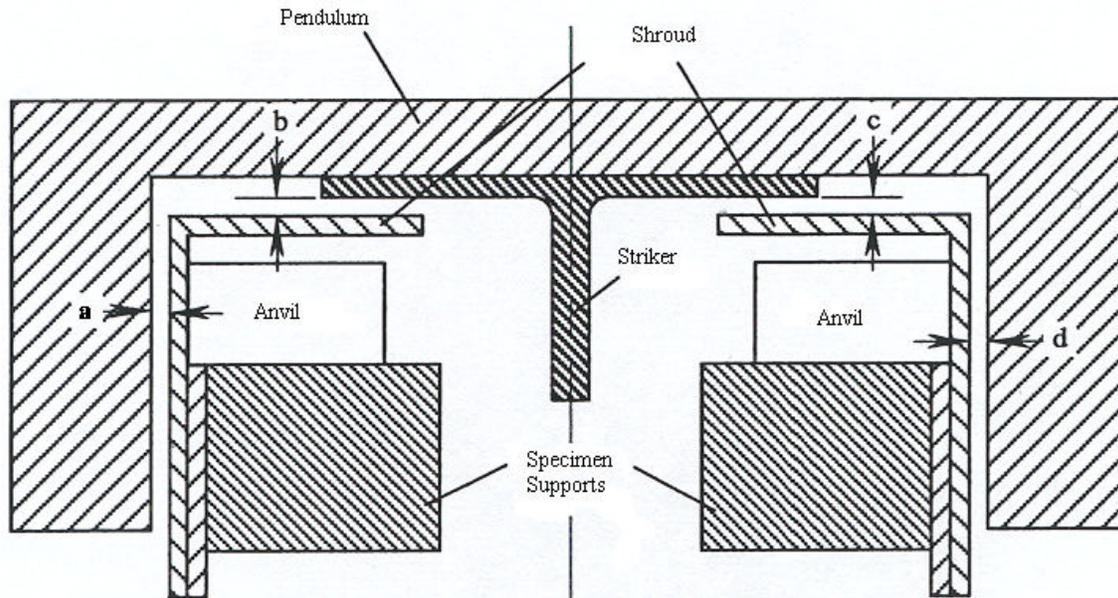
- A: 80° approx.
- R: 1 ± 0.05 mm  
(0.039 ± 0.002 in.)
- W: 40 ± 0.05 mm  
(1.574 ± 0.002 in.)
- B: 90° ± 10 min

Striker

- a: 30° approx.
- r: 8 ± 0.25 mm  
(0.315 ± 0.010 in.)
- w: 4 mm approx.  
(0.157 in.)
- b: 0.25 mm  
(0.010 in.)

10. If shrouds are used to contain broken specimens, the following requirements should apply:

- (A) The shrouds should have a minimum hardness of 45 HRC.
- (B) The thickness of the shrouds should be approximately 1.5 mm (0.06 in.).
- (C) Dimensions a, b, c, and d below should not exceed 1.5 mm (0.06 in.).
- (D) If dimension "d" in item 8 is more than 13 mm (0.5 in.), requirements (B) and (C) above do not apply.



11. The striker should pass through the center of the anvils within 0.40 mm (0.016 in.).

12. With the pendulum in the free hanging position, engage the energy indicator. The indicator should read within 0.2% of the maximum energy range being used.

13. What is the friction/windage loss of your machine? \_\_\_\_\_ Joules ft-lbf

(A) Raise the pendulum to the latched position. Without a specimen in the machine, release the pendulum and permit it to swing 11 half cycles; after the pendulum starts its 11<sup>th</sup> half cycle, align the pointer between 5 to 10% of scale range capacity and record the dial reading. \_\_\_\_\_

(B) Divide the value by 11, then divide by the maximum scale range of the machine and multiply by 100. This is the friction/windage loss of your machine. Record the result above, it should not exceed 0.4%.

14. With the specimen removed from the machine and the pendulum released from its latched position, what is the dial reading after one swing? \_\_\_\_\_ Joules ft-lbf

This reading should be zero. If this reading is not zero and your machine is equipped with a compensated scale, please adjust the dial to read zero. If your machine is equipped with a non-compensated scale, please compensate the energy values for windage and friction by subtracting the friction/windage loss calculated in item 10.

15. When was this machine last verified by the NIST? Date: \_\_\_\_\_

16. Is your machine equipped with a direct reading scale or a non-compensated scale?

## IMPORTANT INFORMATION

The following procedures should be followed closely to obtain accurate results. The test temperature is near the ductile-brittle transition temperature of the steel for the NIST reference specimens. Therefore small variances in temperature and procedure may cause considerable error in energy values.

- The cooling bath should be placed directly beside the machine. This enables the operator to remove specimens from the bath and fracture them in the machine quickly.
- It is very important that the specimens be removed from the bath and fractured in less than five seconds. Taking longer than five seconds can increase the energy values, which may cause the low energy specimens to exceed the allowable energy limit.
- If your machine is equipped with a centering device, we do not recommend that you use it to center specimens when performing low temperature testing. Instead, we recommend the use of centering tongs as described in the current ASTM Standard E 23. The centering tongs should be cooled with the specimens.
- Verify temperature-measuring equipment at least twice annually. Checking a medium with a constant temperature such as dry ice [-78.6 °C (-109.3°F) or ice water [0.0 °C (32.0°F) can be used to check the measurement equipment immediately before the test.
- The anvils should be checked between each test for material left by the previous test when testing super-high energy level specimens or other ductile materials.
- It is recommended that practice specimens be broken before NIST specimens are tested when the anvils are replaced.

## TESTING TECHNIQUE

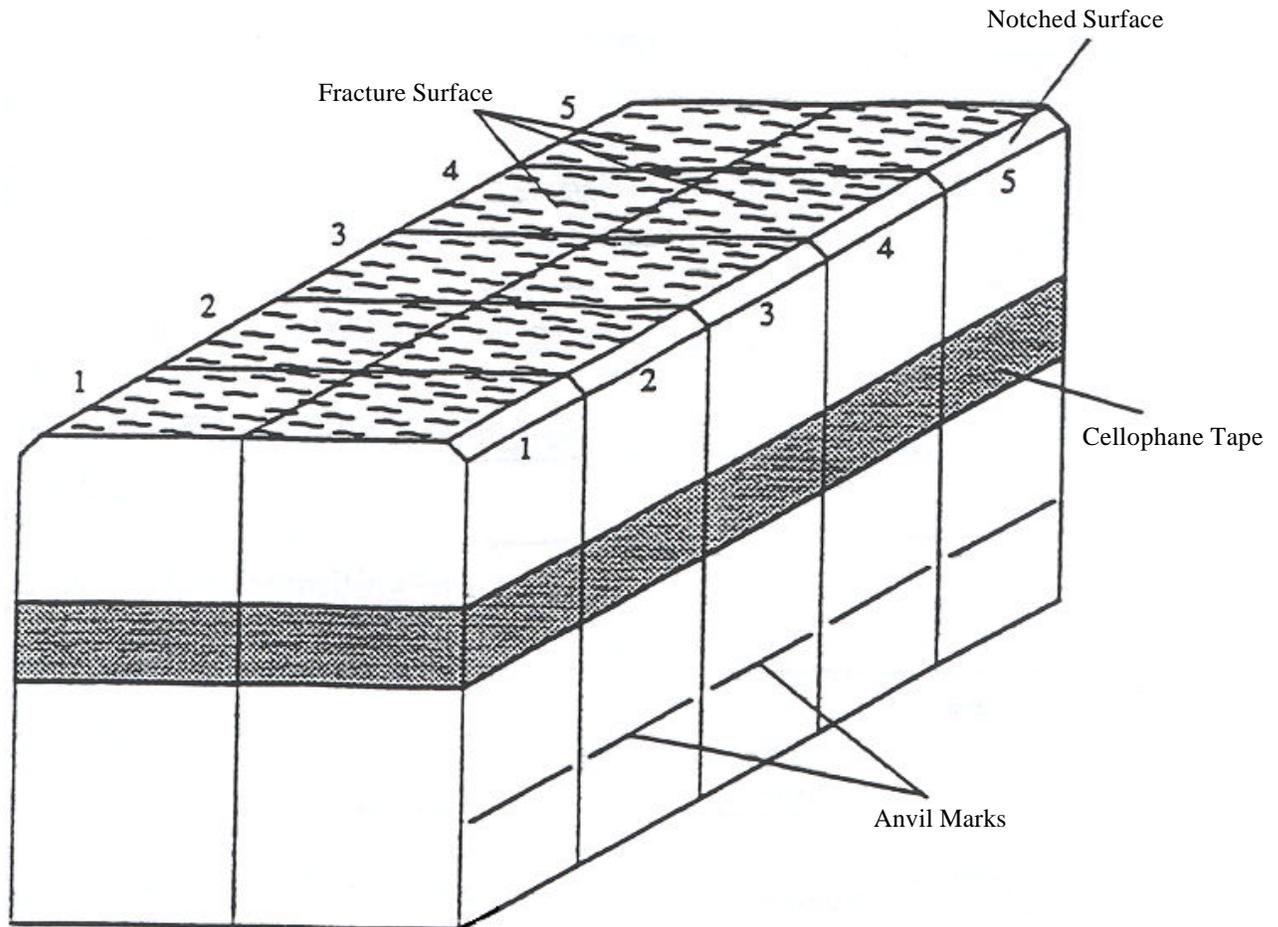
1. Test temperature for SRM 2092 low energy and SRM 2096 high energy level specimens should be  $-40 \pm 1^{\circ}\text{C}$  ( $-40 \pm 2^{\circ}\text{F}$ ).
2. Test temperature for SRM 2098 super-high energy level specimens should be  $21 \pm 1^{\circ}\text{C}$  ( $70 \pm 2^{\circ}\text{F}$ ).
3. How long were the specimens held at temperature? (NIST recommends a minimum of 10 minutes) \_\_\_\_\_
4. What instrument was used to remove the specimens from the bath and center them in the machine? \_\_\_\_\_

## STATE REASON FOR VERIFICATION

1. Compliance with annual ASTM Standard E 23 Indirect Verification \_\_\_\_\_
2. Changed striker and/or anvils \_\_\_\_\_
3. Moved machine \_\_\_\_\_
4. Changed bearings or pendulum \_\_\_\_\_

## WRAPPING INSTRUCTIONS

To expedite the evaluation of your machine, please secure the 5 broken specimens (10 halves) from a particular energy series, as one unit with **clear cellophane tape** according to the following instructions. See diagram below.



1. Keep broken halves correctly paired (back to back) with the fracture surfaces facing upward and notched surfaces facing outward.
2. Coat the **FRACTURE SURFACES ONLY** with a light coat of oil. **DO NOT** use grease or coat in plastic.
3. Include this completed questionnaire with the fractured specimens.
4. Be sure that you use the **MAILING LABEL**, provided with the specimens, and attach the label so that it is clearly displayed on the **OUTSIDE** of the package. This will expedite delivery to the Charpy Coordinator. Customers returning specimens from outside the United States should include the following statement on the U.S. Customs Declaration:  
**Contents include U.S. manufactured steel test bars being returned to the U.S. for evaluation and are valued at less than 10 U.S. dollars.**

### TEST RESULTS

**NOTE:** Use **ONE** questionnaire only to report the **NET ENERGY RESULTS** of all energy levels used to test this machine at this time.

**INDICATE ENERGY UNITS (circle units used)**

**Joules    ft-lbf**

Series _____ SRM 2092		Series _____ SRM 2096		Series _____ SRM 2098	
Specimen Number	Value	Specimen Number	Value	Specimen Number	Value
<b>Average Value</b>		<b>Average Value</b>		<b>Average Value</b>	

Date of Test \_\_\_\_\_  
(Month/ Day/ Year)

\_\_\_\_\_  
PRINT Test Operator Name

\_\_\_\_\_  
Telephone

\_\_\_\_\_  
SIGNATURE Test Operator

\_\_\_\_\_  
FAX

\_\_\_\_\_  
PRINT Company Representative Name

\_\_\_\_\_  
Telephone

\_\_\_\_\_  
SIGNATURE Company Representative

\_\_\_\_\_  
FAX

If you require approval of your machine by the Defense Contract Management Command (DCMC), a DCMC representative should provide his or her **signature and the DCMC seal** to indicate that a government representative witnessed the preceding information.

\_\_\_\_\_  
Print Name of DCMC Official

\_\_\_\_\_  
Signature of DCMC Official

DCMC Seal

\_\_\_\_\_  
DCMC Office Location