



SURFACE VEHICLE RECOMMENDED PRACTICE

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Low Speed Knee Slider Test Procedure for the Hybrid III 50th Male Dummy

RATIONALE

Update page headers to standard SAE formats

Section 2.1.1 Changed reference from "SAE EA-23" to "SAE J2856"

Section 3.1.c Changed reference from "J211" to "J211/1"

Section/Paragraph 4.1 Changed the text of "by the SAE Dummy Testing Equipment Subcommittee of the SAE Human Biomechanics and Simulation Standards Committee" to "Prepared by the SAE Dummy Testing Equipment Standards Committee"

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1. SCOPE

This procedure establishes a recommended practice for performing a Low Speed Knee Slider test to the Hybrid III 50th Male Anthropomorphic Test Device (ATD or crash dummy). This test was created to satisfy the demand from industry to have a certification test which produces similar results to an actual low energy automotive impact test. An inherent problem exists with the current certification procedure because the normal (2.75 m/s) knee slider test has test corridors that do not represent typical displacements seen in these low energy impact tests. The normal test corridors specify a force requirement at 10 mm and at 18 mm, while the low speed test needs to have a peak displacement around 10 mm.

1.1 Purpose

The intent of this recommended practice is to develop a low speed knee slider test procedure for the H-III50M dummy with a 10 mm deflection range.

2. REFERENCES

2.1 Applicable Documents

The following publications form a part of this specification to the extent specified herein. Unless otherwise indicated, the latest issue of SAE publications shall apply.

2.1.1 SAE Publications

Available from SAE International, 400 Commonwealth Drive, Warrendale, PA 15096-0001, Tel: 877-606-7323 (inside USA and Canada) or +1 724-776-4970 (outside USA), www.sae.org.

SAE J2856 User's Manual for the 50th Percentile Male Hybrid III Dummy

SAE J211/1 Instrumentation for Impact Test - Part 1 - Electronic Instrumentation

2.2 Related Publication

The following publication is provided for information purposes only and are not a required part of this SAE Technical Report.

2.2.1 Federal Publication

Copies of these documents are available online at <http://quicksearch.dla.mil>.

Motor Vehicle Regulation No. 572 Test Dummies Specifications - Anthropomorphic Test Dummy for Applicable Test Procedures

3. CERTIFICATION PROCEDURES

3.1 Preparation

a. The components required for the knee slider test are:

- Left or right knee assemblies with ball bearing knee sliders
(79051-201 – left knee assembly; 79051-202 – right knee assembly)
- Displacement transducer
(79051-229 – left knee potentiometer; 79051-230 – right knee potentiometer)

NOTE: Knee flesh (78051-5 / 78051-6) is not to be used for this test.

- b. The test fixture consists of a rigid test probe and a method of rigidly supporting the knee assembly. The test probe mass is $12.000 \text{ kg} \pm 0.020 \text{ kg}$ ($26.460 \text{ lb} \pm 0.044 \text{ lb}$), including instrumentation, rigid attachments and the lower 1/3 suspension cable mass. The diameter of the impacting face is $76.20 \text{ mm} \pm 0.25 \text{ mm}$ ($3.00 \text{ in} \pm 0.01 \text{ in}$) with an edge radius of 0.5 mm (0.02 in). A load distribution bracket is required to transmit the impact energy into the slider assembly, as seen in Figure 1.

NOTE: The Ensolute® pad is closed cell foam that can be damaged by impact and age. The pad should be regularly inspected and replaced if there are signs of damage and/or degradation.

- c. The data acquisition system, including transducers, must conform to the specifications of the latest revision of SAE Recommended Practice SAE J211/1. Filter the displacement data channel using Channel Class 180 phaseless filters.

3.2 Instrumentation Specifications

- 3.2.1 The displacement transducer must have a maximum nonlinearity error no greater than $\pm 0.16 \text{ mm}$ in the displacement range being measured. This may be accomplished with linearization equations if needed.

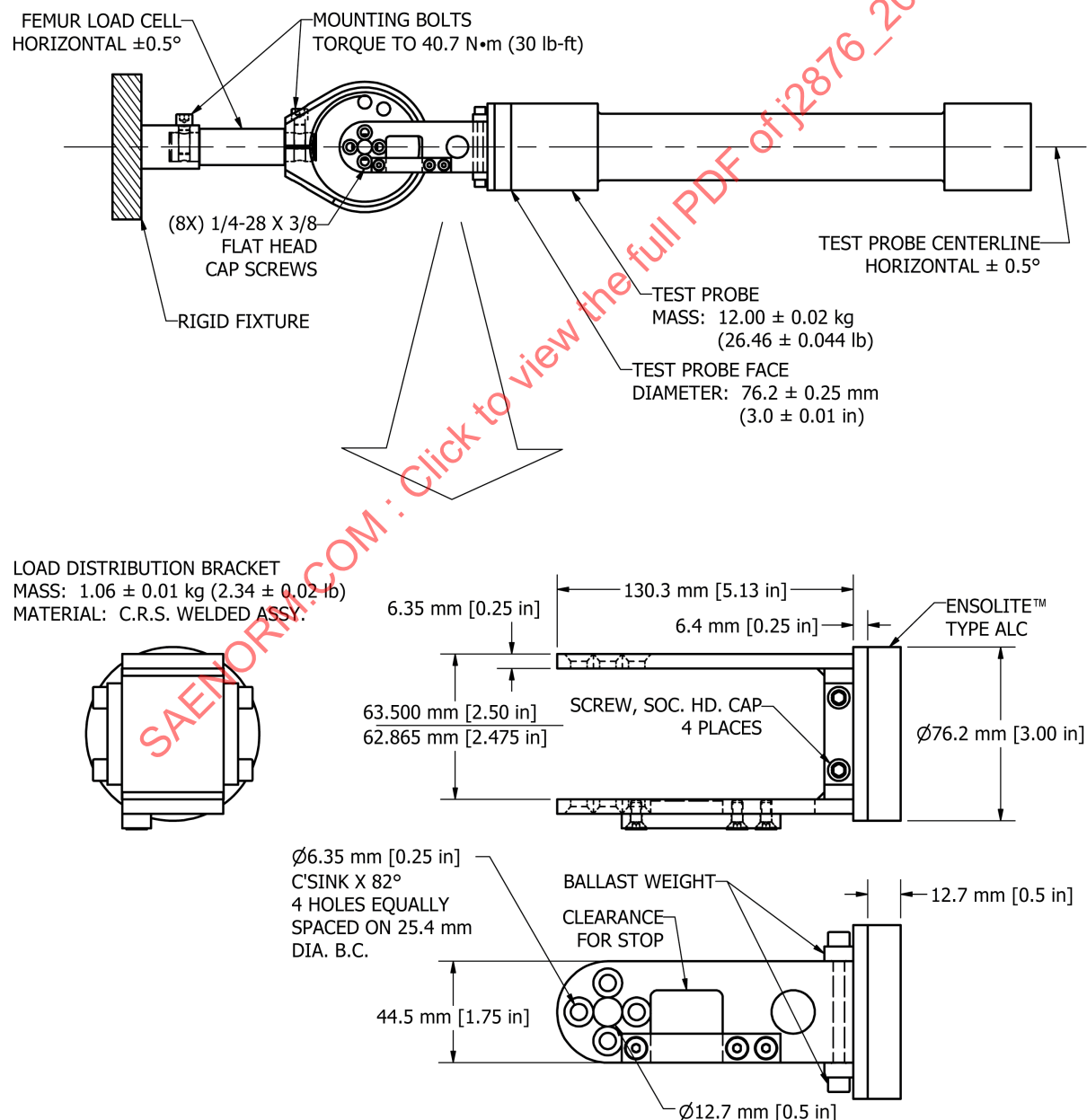


Figure 1 - Knee slider test setup

3.3 Test Procedure

- 3.3.1 Inspect the knee assembly for damage. Pay particular attention to the left and right side slider assemblies to ensure that the tracks are free from damage and debris.
- 3.3.2 Soak the knee assembly in a controlled environment with a temperature between 20.6 °C and 22.2 °C (69 °F to 72 °F) and a relative humidity from 10 to 70 percent for at least four hours prior to a test. The test environment should have the same temperature and humidity requirements as the soak environment.
- 3.3.3 Check that all transducers are properly installed, oriented, and calibrated.
- 3.3.4 Mount the knee assembly to the fixture using a femur load cell or load cell replacement. Torque the two mounting bolts to 40.7 N•m (30 ft-lbf) to prevent slippage of the assembly during impact. Attach the load distribution bracket to the slider assembly. The bracket is attached to the inboard and outboard slider assemblies in the same manner as the knee clevis, so the impacted bracket will slide rearward in the track.
- 3.3.5 Align the longitudinal centerline of the test probe so at the time of impact, it is collinear (within 2°) with the longitudinal centerline between the load cell and the load distribution bracket. The test probe longitudinal centerline should be horizontal within 0.5°. The test setup appears in Figure 1.
- 3.3.6 Guide the probe so no significant lateral, vertical or rotational motion occurs at the time of contact between the test probe face and the load distribution bracket.
- 3.3.7 A break-in test before the certification test is permitted as long as the wait time between tests has elapsed before performing the first certification test.
- 3.3.8 The test probe velocity at the time of impact is $1.55 \text{ m/s} \pm 0.02 \text{ m/s}$ ($5.09 \text{ ft/s} \pm 0.07 \text{ ft/s}$). Velocity must be measured as close as possible to impact. Table 1 indicates the drop heights for the velocity range.

Table 1 - Drop height table

Velocity (m/s)	Drop Height (mm)	Drop Height (in)
1.57	125.6	4.946
1.55	122.5	4.821
1.53	119.3	4.697

- 3.3.9 Time-zero is defined as the time of initial contact between the test probe and the load distribution bracket. All data channels should be at zero level at this time.
- 3.3.10 Wait at least 30 minutes between successive tests on the same knee slider assembly.

3.4 Performance Specifications

- 3.4.1 The peak knee slider displacement is to be within $-11.00 \text{ mm} \pm 1.67 \text{ mm}$ ($-0.4331 \text{ in} \pm 0.0657 \text{ in}$).