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SAE J1051 DEC88

Force-Deflection Measurements of Cushioned Components of Seats for Off-Road Work Machines

SAE Standard
Revised December 1988

Submitted for Recognition as an American National Standard

The Engineering Society For Advancing Mobility Land Sea Air and Space®
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OFF-HIGHWAY MACHINERY STANDARD

Submitted for recognition as an American National Standard

SAE J1051

Issued January 1974
Revised December 1988

Superseding J1051 JAN80

Ø FORCE-DEFLECTION MEASUREMENTS OF CUSHIONED COMPONENTS OF SEATS FOR OFF-ROAD WORK MACHINES

1. PURPOSE/SCOPE:

This SAE Standard provides a method to obtain consistent force-deflection data of finished (or unfinished, when specified) cushioned components of seats for off-road work machines as listed in SAE J1116 JUN86. This data may be helpful in maintaining seat comfort characteristics and quality control. There is no intent to establish any acceptance criteria.

2. TEST APPARATUS:

2.1 A 200 mm diameter, rigid, flat or curved indentor (Fig. 1 and Fig. 2) or a 50 mm diameter, rigid, flat indentor (Fig. 1). The indentor force shall be applied through a rigid joint or a swivel joint capable of accommodating the angle of the top surface of the test specimen.

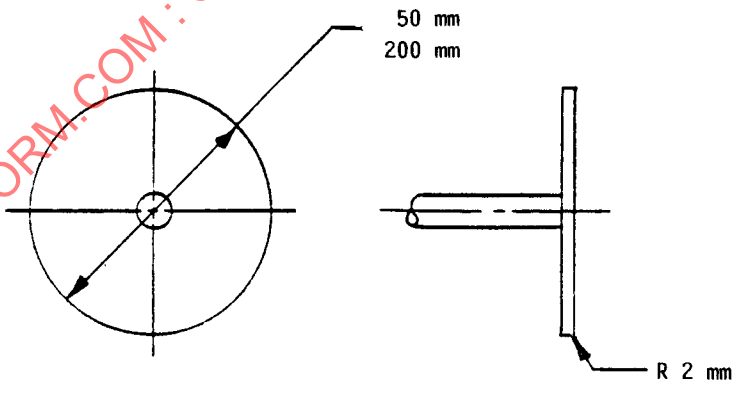

FIGURE 1 - Flat Indentor

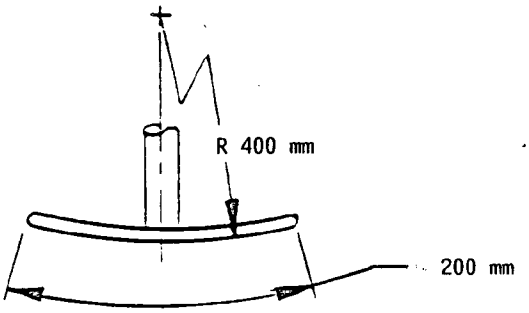

FIGURE 2 - Curved Indentor

2.2 A platform capable of positioning the top surface of the test specimen parallel to and centered with the rigid joint indentor and not to restrict the breathing or normal deformation of the specimen tested (Fig. 3). The indentor with the swivel joint may be preferred for tapered or irregular shaped cushions or for a fixed platform (Fig. 4).

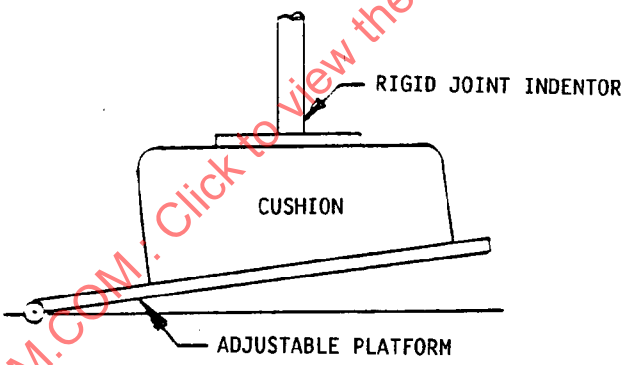

FIGURE 3

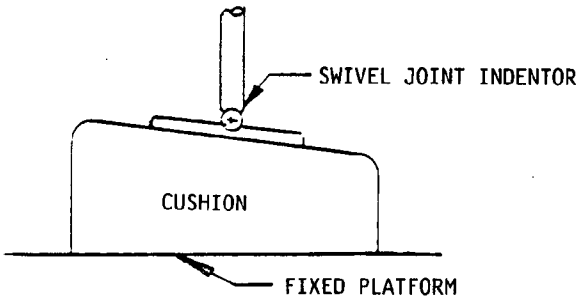

FIGURE 4

2.3 An apparatus capable of applying forces and measuring the deflection of the indentor into the specimen.

3. PROCEDURE:

3.1 The test specimen shall consist of a seat cushion, back cushion or other components in an unused condition (with packaging or protective bag removed).

3.2 Test Conditions: The specimen shall be conditioned, undeflected and undistorted at 22°C ± 2.8 and relative humidity of 50% ± 2 for at least 12 h before being tested. The tests shall be performed 96 h or more after the manufacture of the raw materials used in the test specimen (foam, elastic components other than metal, etc.). In case of a question, refer to the applicable SAE or ASTM specification (if available) for the particular material.

3.3 Test Method:

3.3.1 Mount the specimen with the top surface parallel to and centered with the indentor, unless otherwise specified by mutual agreement of the manufacturer and customers. The 200 mm diameter curved or flat indentor shall be used on seat and back cushions unless otherwise specified. A light muslin of a quality comparable to a grade described as a weave of 48 threads per inch and density of 190 g/m^2 is allowed to prevent marking of the component. In the case of components with unusual shapes or contours, location for placement and the size of the indentor is to be agreed upon by the manufacturer and customer and shall allow a minimum of 80% of the indentor area to be in contact when the initial zeroing force of 3.3.3 is applied. (Example: Smaller diameter or curved indentor for curved backrest - see Fig. 2).

3.3.2 Preflex the test specimen three times by compressing and releasing the force at a rate of 100 mm/min. The specimen shall be compressed by applying the noted force, or a force, which would compress the specimen to not less than 20% of its original thickness.

Seat cushion:	1334 N
Back cushion:	664 N
Other Components:	Compress to 20% of original thickness

Allow 10 ± 5 min for the specimen to stabilize after preflexing and before continuing the test.

3.3.3 Determine the base, which deflections will be measured, by applying a force of 45 N to the 200 mm diameter indentor or 10 N to the 50 mm diameter indentor and zero the deflection scale.

3.3.4 For the 200 mm indentor, apply an incremental force slowly, no greater than 222 N, to minimize shock. Allow 1 min for the specimen to stabilize, then measure the deflection. Continue this incremental procedure without removing the preceding force until the maximum force of 1334 N for the seat cushion and 667 N for the back cushion is reached. For the 50 mm indentor or thin cushions, incremental deflection vs force may be more desirable. When incremental deflection is used, the specimen shall be compressed to not less than 20% of its original thickness. When the maximum force is 45 N or less the indentor diameter should be increased if possible.

3.3.5 After reaching the maximum force, reduce the force slowly (minimize shock) in 222 N maximum increments, allowing 1 min for the test specimen to stabilize before measuring deflection at each increment.

3.3.6 Return time: Deflect the cushion to 25% ± 2.5 of undeflected condition and hold for 1 min. Release the load in 0.5 s or less and record the time taken to return to the undeflected condition.

4. DATA REQUIRED:

4.1 Description of the test specimen (Manufacturer's name, number, etc.).

4.2 Diameter and curvature of the indentor.

4.3 Deviations on special test conditions.

4.4 Location of the indentor on the test specimen.

4.5 Record all force-deflection data taken during the application and removal of the force on the test specimen.

4.6 Plot the force on the Y-axis versus deflection on the X-axis.

The phi (Ø) symbol is for the convenience of the user in locating areas where technical revisions have been made to the previous issue of the report. If the symbol is next to the report title, it indicates a complete revision of the report.

RATIONALE:

1. Result of the 5 year review of all practices.

2. This recommended practice has been changed to a standard. The character of the changes helps broaden and explain the methods and provide consistency in the measurements without changing the requirements or scope of the existing document.

3. All dimensions, per SAE directive, are in metric only and have been rounded off without affecting the data.

4. The scope has been revised to include the purpose and SAE J1116 JUN86 is referenced to identify the machines affected.

5. Because of the broadened scope of this test to include smaller cushions than a seat or back cushion, a smaller diameter (50 mm) indentor has been added. Necessary precautions have been included in determining the proper use of 50 and 200 mm diameter indentor.

6. An important comfort characteristic, cushion rebound, has been added.

RELATIONSHIP OF SAE STANDARD TO ISO STANDARD:

Not applicable.

REFERENCE SECTION:

SAE J1116 JUN86, Categories of Off-Road Self-Propelled Work Machines

APPLICATION:

This SAE Standard provides a method to obtain consistent force-deflection data of finished (or unfinished, when specified) cushioned components of seats for off-road work machines as listed in SAE J1116 JUN86. This data may be helpful in maintaining seat comfort characteristics and quality control. There is no intent to establish any acceptance criteria.

COMMITTEE COMPOSITION:

DEVELOPED BY THE SAE HFTC/SUBCOMMITTEE 4:

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