SURFACE VEHICLE RECOMMENDED PRACTICE

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Steering Control System - Passenger Car - Laboratory Test Procedure

RATIONALE

The technical report covers technology, products, or processes which are mature and not likely to change in the foreseeable future.

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1. Scope—This SAE Recommended Practice describes a laboratory test procedure for evaluating the characteristics of steering control systems under simulated driver impact conditions. The test procedure employs a torso-shaped body block which is impacted against the steering control system.

2. Definition—For the purposes of this recommended practice, the steering control system is defined as that portion of the vehicle steering mechanism that may affect the occupant impact characteristics.

3. Reference—SAE J977.

4. Items to be Determined

4.1 Impact velocity of the body block.

4.2 Peak resultant force of the impact.

5. Test Equipment and Instrumentation

5.1 Body Block—The complete body block shall have the following characteristics:

5.1.1 SPRING RATE—107–143 kg cm. when the chest is loaded by a 4 in. wide by 15 in. long (10.0 by 38.0 cm) beam, 90 deg to the longitudinal axis of the body block, and parallel to the backing plate (Fig. 1). The center of the beam is placed 18.0 ± 0.25 in. (45.7 ± 0.63 cm) from the top of the head, centered laterally, and preloaded to 5 lb (2.26 kg) including the weight of the beam, to establish baseline penetration. Test speed is 10 ± 2 in./minute (25.0 ± 5 cm/minute). The load is measured when the beam has moved 0.50 in. (12.7 cm) into the body block from the baseline and the spring rate is obtained by doubling this load.

5.1.2 WEIGHT—The body block shall weigh 75 +5 −0 lb (33.97 +2.26 −0 kg).

5.1.3 BODY BLOCK CENTER OF GRAVITY—The center of gravity of the complete body block shall be 21.7 ± 0.25 in. (55.12 ± 0.63 cm) from the top of the head.

5.1.4 MOMENT OF INERTIA—The moment of inertia around the lateral axis through the center of gravity of the complete body block shall be 20 ± 2 in.-lb. sec² (23 ± 2.3 cm-kg sec²).

5.1.5 Configuration of the body block is shown in Figs. 2–4. Information on details and construction of the body block can be obtained from SAE, 18121 E. Eight Mile Road, Detroit, Michigan 48021.

5.2 Instrumentation—Any system of instrumentation that will provide data from which the items in paragraph 4 can be determined and meet the performance requirements of SAE J977 is acceptable, with the following exception:

5.2.1 The force measuring channels shall have a frequency response flat to within ±5% from 0.1 Hz to 500 Hz and shall be at least 3 db down at a maximum of 1500 Hz.

5.3 Any test equipment is satisfactory which can produce the desired body block-to-steering control system impact velocity and which insures that the body block is moving parallel to the vehicle horizontal reference, with translational (not rotational) motion, in side view at impact. (See Fig. 5.) The direction of impact velocity, in the plan view, is parallel to the longitudinal vehicle axis.

5.4 The steering control system shall be mounted in the actual vehicle, vehicle buck, or on a fixture that is at least as rigid as the actual vehicle mounting.

5.5 If a load cell is used, it must be mounted between the column and the steering wheel (or equivalent).

6. Test Procedure

6.1 Vertical relationship between steering wheel and body block shall be established in the following manner:

6.1.1 Using the package drawing of the particular vehicle in which the steering system is to be used, determine the vertical dimension between the lower edge of the wheel rim and a point 0.75 in. (1.90 cm) vertically above the seating reference point[1] of the driver.

[1]Seating reference point means the manufacturer's design reference point which:
1. Establishes the rearmost normal design driving or riding position of each designated seating position in a vehicle.
2. Has coordinates established relative to the designed vehicle structure.
3. Simulates the position of the pivot center of the human torso and thigh.
4. Is the reference point employed to position the two-dimensional templates described in SAE J826.

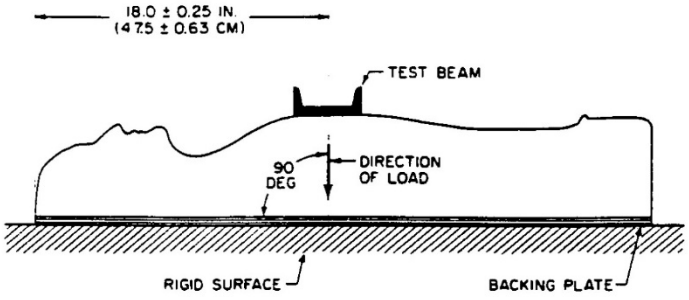

FIG. 1—TEST BEAM LOCATION

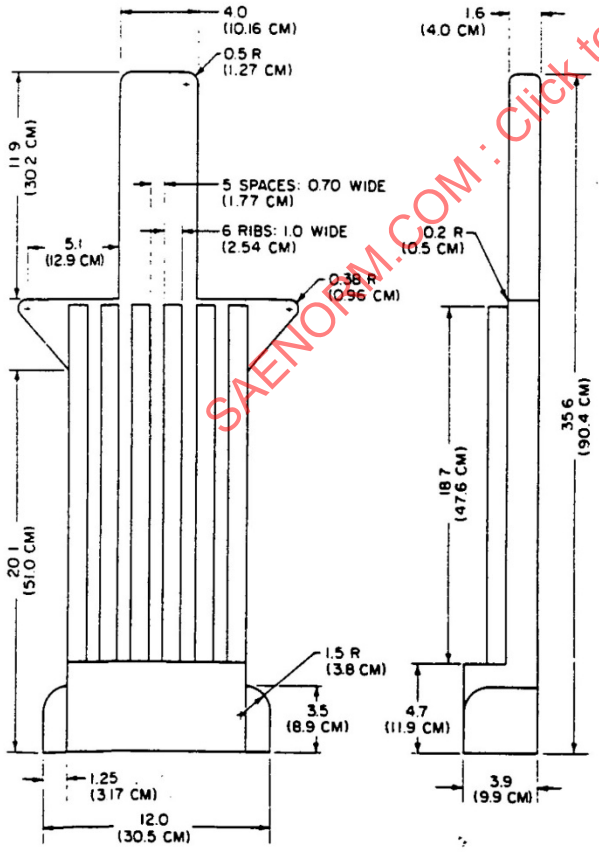

FIG. 2—MOLD INSERT

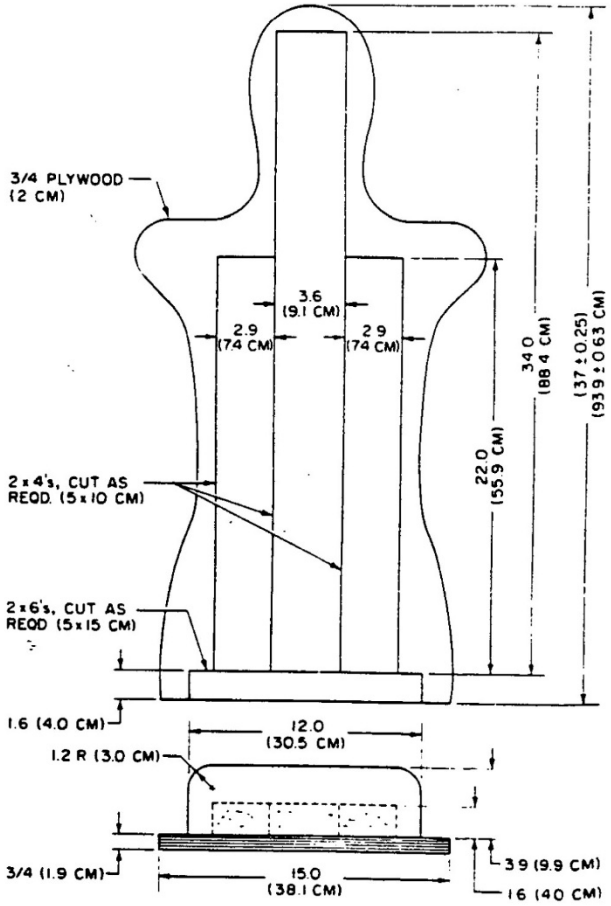

FIG. 3—BACKBOARD AND BASE