SAE International™

SURFACE VEHICLE RECOMMENDED PRACTICE

SAE J367

CAN-CELLED FEB2003

Issued 1970-03
Cancelled 2003-02

Superseding J367 JUN1980

Passenger Car Door System Crush Test Procedure

***Foreword*—**This document has been superseded in its entirety by the Federal Motor Vehicle Safety Standard 49 CFR 571 214 S4.

1. *Scope*—This SAE Recommended Practice establishes a uniform laboratory test method to evaluate the capability of passenger car door systems to resist a concentrated lateral inward load. The procedure is intended to provide repeatable results and to permit numerical comparisons.

A test is conducted in which the door and related structural members of the vehicle are loaded under controlled laboratory conditions. Structural strength measurements obtained under these conditions are reproducible. Background information and rationale for the test procedures described in this Recommended Practice are provided in the Appendix.

2. *References*—There are no reference publications specified herein.

3. *Test Equipment*

3.1 General—The test is conducted in a laboratory on equipment suitable for applying and measuring required loads and deflections.

3.2 Loading Device—The test load is applied to the vehicle door with a rigid cylindrical or semi-cylindrical device, 30.5 cm (12 in) in diameter and 61.0 cm (24 in) long with its axis vertical. The length of the loading device shall be decreased to preclude contact of the loading device with windshield or roof structure or the door frame above the bottom edge of daylight opening (DLO) during test (see Figure 1). The load shall be applied in a horizontal direction at 90 degrees to a vertical plane through the vehicle longitudinal centerline. The loading device shall be guided so as to prevent any rotation or any displacement normal to its travel and shall be capable of at least 61.0 cm (24 in) of travel. The 61.0 cm (24 in) of travel of the loading device shall be obtained in not less than 2 seconds and not more than 120 seconds. The rate of travel of the loading device shall be essentially constant.

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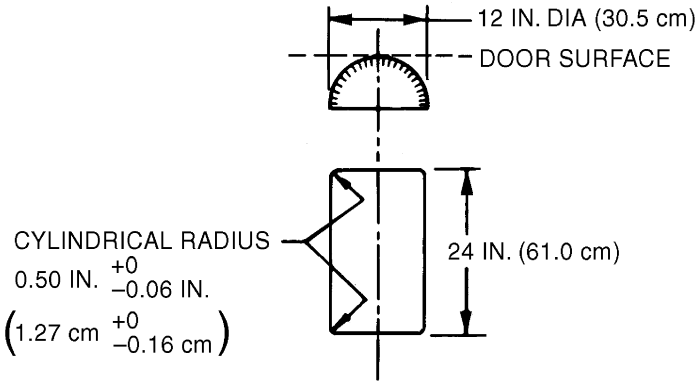

FIGURE 1—LOADING DEVICE

3.3 Instrumentation—Provisions shall be made for measuring applied load and deflection. Frequency response of the instrumentation shall be adequate to plot load deflection curves. Instrumentation accuracy shall be within ±3%.

4. Test Procedure

4.1 Body or Vehicle to be Tested—A vehicle or body and chassis frame (if applicable) shall be tested. All standard door system components which may affect load or deflection shall be installed. For purposes of this test seats and steering wheel shall not be installed. Only one door shall be tested on the same side of the vehicle; and tests shall be performed on the other side only if the frame, floor, and remaining sill are essentially undistorted.

4.2 Vehicle Support—The vehicle or body and chassis frame shall be rigidly mounted in a manner that will not restrict the deflection of the door system being tested. This may be accomplished by bolting the chassis frame to a flat horizontal bed plate. Attachments may be made at any location along the chassis and/or at the suspension mounting points. If a chassis frame is not used, attachments may be made to the underside of the body, avoiding attachments to the body sill on the side of the body being tested. The primary lateral load may be resisted by allowing the opposite body sill to bear against a rigid vertical surface.

4.3 Location of Loading Device—The loading device shall be located with its vertical axis and bottom surface opposite the midpoint of the body door minimum opening as measured 10.0 cm (4 in) above the highest surface of the body sill. The loading device shall be in contact with the door. (See Figures 2 and 3.)

4.4 Test Measurements—The following measurements shall be recorded to obtain load deflection curves.

a. Load applied to the loading device.
b. Outer panel deflection as measured by displacement of the loading device relative to the undisturbed body structure. The load deflection curve shall be plotted for 61.0 cm (24 in) of ram travel measured from initial contact point. The test may be terminated earlier if significant structural failure occurs.

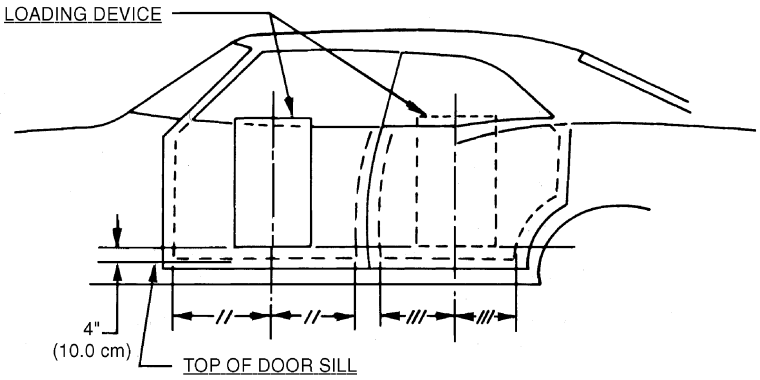

FIGURE 2—LOADING DEVICE LOCATING INFORMATION

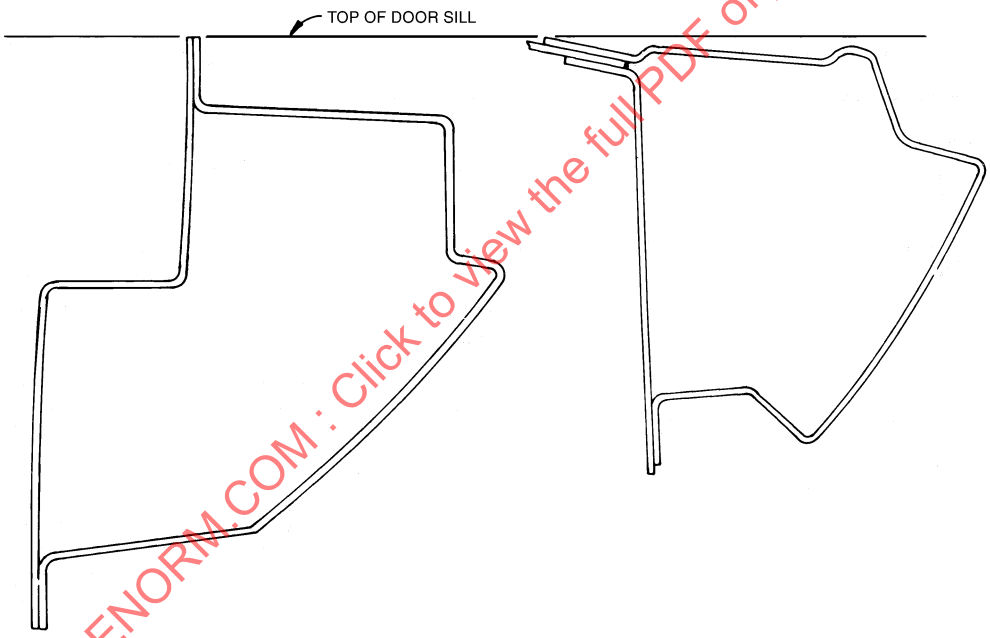

FIGURE 3—TYPICAL CROSS SECTION ROCKER PANELS

PREPARED BY THE SAE IMPACT AND ROLLOVER COMMITTEE

APPENDIX A

PASSENGER CAR DOOR SYSTEM CRUSH TEST PROCEDURE

A.1 ***Background Information—***The test procedure outlined in this SAE Recommended Practice is the culmination of extensive testing undertaken by the Impact and Roll-Over Test Procedures Subcommittee of the SAE Automotive Safety Committee, in an effort to evolve a comparable and repeatable procedure for evaluating the effect of side impact collisions. Car-to-car and rigid moving barrier-to-car tests were among the many approaches considered. It was readily recognized that while car-to-car tests are realistic, the numerous variables which are introduced make repeatability very difficult. Considerable attention was given and is still being given, to the development of a rigid moving barrier having a contoured surface simulating the front end of an impacting vehicle. While the results to date indicate that this approach can produce repeatable results, correlation with car-to-car collisions has not been established. Recognizing these limitations of dynamic full-scale vehicle tests, the Subcommittee began exploration of a static test procedure on that portion of the side structure which appeared to be most vulnerable in side impact collisions, that is, the door system. The result of that exploration is reported in this recommended practice.

A.2 ***Door System Crush Test Procedure Rationale—***In addition to providing a reproducible test procedure of an area known to be of interest in evaluating side impact collisions, it was felt that the static test procedure would also provide a good first step in accumulating data which could be applied to the development of other dynamic test procedures, such as car-to-car and moving barrier. In this initial phase, the principle of the test described in this recommended practice is to establish a method of measurement for comparing one door system to another for development purposes only, independently of its actual behavior in complete car collisions. The test provides a measure of the work capability of a door system in resisting a concentrated lateral inward load. While it is recognized that the test procedure is not a complete measurement of passenger compartment integrity in terms of passenger safety during lateral collisions, it does provide a practical test of important structural parameters that do contribute to safety.

A.3 ***Specific Items and Test Procedure—***The vertical spacing between the loading head and the sill was specified to minimize the possibility of bind-up of the door sheet metal between the loading device and the sill. It is essential that bind-up be minimized because it may provide a misleading indication of the door system's capability to resist the applied load. The loading head location and geometry are predicated on production door and sill configurations in general current usage. It is possible that adjustments may have to be made to the test procedure in the future as major design changes occur.

The loading device configuration, its location, and the instrumentation requirements are the result of tests conducted by a number of laboratories and represent a realistic compromise among the various approaches.

The vehicle seats and steering wheel are not included in this test procedure because it is intended to evaluate door as a separate entity. Addition of seats and steering wheel would add a significant variable to the test results and would not be in keeping with the intent of the test procedure.