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SURFACE VEHICLE RECOMMENDED PRACTICE

An American National Standard

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REAR UNDERRIDE GUARD TEST PROCEDURE

1. ***Scope***—This SAE Recommended Practice is intended to provide a uniform basis for evaluating the effectiveness of rear underride devices employed to reduce the likelihood of penetration of the passenger compartment of an impacting vehicle. The procedures described in this document provide means for determining the characteristics of a rear underride guard, taking into consideration the nature and direction of forces involved.

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

3. ***Discussion***—The static test procedure outlined in this document was established after a detailed study which included field observations of typical rear-end collisions involving heavier vehicles being impacted by lighter passenger vehicles. These observations, as well as analysis of typical accidents, indicated that the underride guard is essentially an occupant rather than a vehicle protection device. It was also recognized that in establishing the characteristics of an underride guard and the test procedures to evaluate it, due consideration had to be given to establishing a realistic balance between providing protection for the major portion of vehicles operating on United States highways and avoiding undue restriction on the mobility and operating characteristics of vehicles equipped with underride devices. Taking these factors into consideration, it was concluded that the development of uniform procedures for evaluating the characteristics of underride guards would be of assistance in the design and engineering of these types of devices and would provide a basis for comparative tests of the devices at various facilities. It was also recognized, however, that evaluation procedures involving full-scale components and vehicles in dynamic situations, although most representative of actual impacts, had serious limitations.

   Thus, few laboratory facilities are available that can readily conduct this type of evaluation, and the establishment of adequate facilities will involve cost outlays beyond the means of many laboratories. Additionally, the limited production of specialized vehicles, which might be equipped with underride guards, would mean destructive testing of an unduly high percentage of the production run. Finally, the varying nature of the configuration and size of passenger vehicles which may impact rear underride guards, as well as the direction and velocity at which the barriers are impacted, further complicates the establishment of uniform full-scale evaluation procedures. For these reasons, it was decided to present a test procedure for static testing of vehicle components.

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4. Static Test

4.1 Test Equipment

4.1.1 GENERAL—The static test is conducted with equipment suitable for applying and measuring the required loads and deflections.

4.1.2 LOADING PLATE—The test load is applied to the guard through a 12 x 12 in (305 x 305 mm) steel plate of sufficient thickness to preclude deformation. The width of this plate approximates the width of a typical 6-cyl engine block, and represents a concentrated load application.

4.1.3 INSTRUMENTATION—Provision shall be made for measuring applied load and longitudinal displacement of the loading plate.

4.2 Test Procedure

4.2.1 INSTALLATION—The guard shall be attached to a complete frame, the affected portions of the body and chassis frame, or frame alone. The vehicle, or portion thereof, being tested shall be rigidly supported in a manner that will not restrict deformation of the guard and affect parts of the chassis frame and body. All components which may affect load or deflection shall be installed.

4.2.2 TEST ZONE—With the vehicle at curb weight, the test zone is determined as follows (Figure 1):

a. This zone is bounded by horizontal planes at 66 in (1680 mm) above ground level and at 18 in (455 mm) above ground level.
b. The rearmost boundary of the zone is a lateral, vertical plane containing that chassis, body or component point, excluding the underride guard and its horizontal supports, that is between 18 in (455 mm) and 66 in (1680 mm) above ground level and is rearmost on the vehicle. The forward boundary of this zone is a lateral, vertical plane 25 in (635 mm) forward of the rearmost boundary.
c. The lateral boundaries are determined by longitudinal, vertical planes containing the points on each side of the vehicle that have the greatest lateral positions at or within the above vertical and longitudinal boundaries, exclusive of flexible fender extensions and mud flaps.

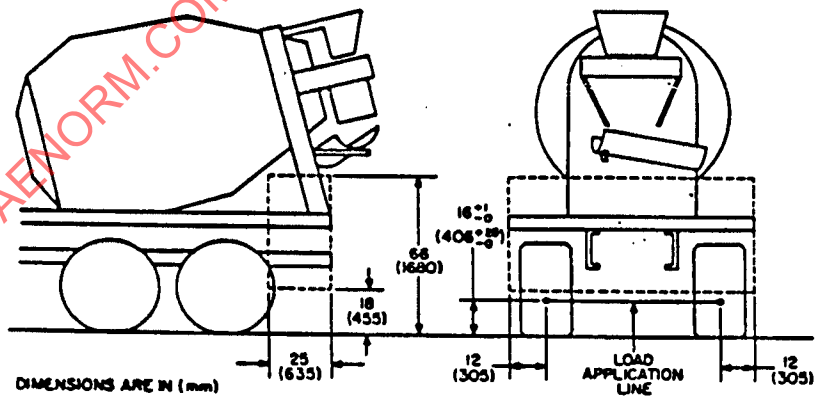

FIGURE 1—UNDERRIDE GUARD TEST ZONE

4.2.3 LOAD APPLICATION—The underride guard shall be tested by applying the test load through the loading plate in the direction of vehicle forward horizontal travel at locations defined below.

The test load shall be applied to the underride guard with the center of the loading plate at any location between two points 12 in (305 mm) inboard from each of the two lateral boundaries. At least one test load cycle shall be conducted with the loading plate located at that point across the load application line reasonably expectable by documented engineering inspection to yield either the greatest deformation for a given load or the least load to produce a given deformation. During these load applications, the center of the loading plate shall be 16 + 1, –0 in (406 + 25, –0 mm) from ground level on a vehicle at curb weight. It is not required that a guard loaded at one point be able to withstand subsequent loading at a second point.

4.2.4 The loading rate shall not exceed 10 in/s (254 mm/s). The time of load application shall not exceed 2 min.

4.2.5 The vehicle or portion thereof to be tested may be oriented to facilitate testing, but the relative orientation of loading plate and vehicle as prescribed above shall be maintained. The loading plate placement is specified to assure distribution of the load over a reasonable area without gaining load-carrying ability from vehicle components too high to contribute to underride protection.

4.2.6 TEST TERMINATION—The test may be terminated when the desired load or deflection is reached, and must be terminated if the underride guard deforms to allow the loading plate to reach the forward boundary limit 25 in (635 mm) forward of the rearmost boundary.

4.3 Test Measurements

4.3.1 The following measurements shall be recorded:

a. Load applied to the loading plate.
b. Loading plate displacement.

5. Notes

5.1 Marginal Indicia—The change bar (l) located in the left margin is for the convenience of the user in locating areas where technical revisions have been made to the previous issue of the report. An (R) symbol to the left of the document title indicates a complete revision of the report.

PREPARED BY THE SAE IMPACT AND ROLLOVER TEST PROCEDURE STANDARDS COMMITTEE