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COE Frontal Strength Evaluation—Quasi-Static

1. **Scope**—This SAE Recommended Practice describes the test procedures for conducting quasi-static frontal strength test for COE heavy truck applications. Its purpose is to establish recommended test procedures which will standardize the procedure for heavy trucks. Descriptions of the test set-up, test instrumentation, photographic/video coverage, and the test fixtures are included.

2. **References**

2.1 **Applicable Publications**—The following publications form a part of the specification to the extent specified herein. Unless otherwise indicated the latest revision of SAE publications shall apply.

2.1.1 SAE PUBLICATIONS—Available from SAE, 400 Commonwealth Drive, Warrendale, PA 15096-0001.

SAE J211—Instrumentation for Impact Test

SAE J826—Devices for Use in Defining and Measuring Vehicle Seating Accommodation

SAE J1516—Accommodation Tool Reference Point

SAE CRP-9—"Heavy Truck Crashworthiness (Statistics, accident Reconstruction, Occupant Dynamics Simulation)", March 1995.

SAE CRP-13—"Heavy Truck Crashworthiness (Phase III)," April 1997.

2.1.2 OTHER PUBLICATIONS

ECE Regulation 29: Uniform Provisions Concerning the Approval of Vehicles with Regard to the Protection of the Occupants of the Cab of a Commercial Vehicle.

3. **Definitions**

3.1 **Platen**—A structurally stiff, flat plate.

3.2 **Cab Mount**—The component or components used to connect the cab to the chassis frame rails.

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4. **Test Configuration**—The COE frontal strength test is designed to evaluate the resistance of a COE vehicle in an impact into the rear of a heavy-truck trailer. The rear of the trailer is simulated as a rigid surface. With the cab attached to the ground through its cab mounts, a platen is forced to longitudinally move into the cab at a rate not more than 13 mm/s (1/2 in/s). This loading configuration is shown in Figure 1.

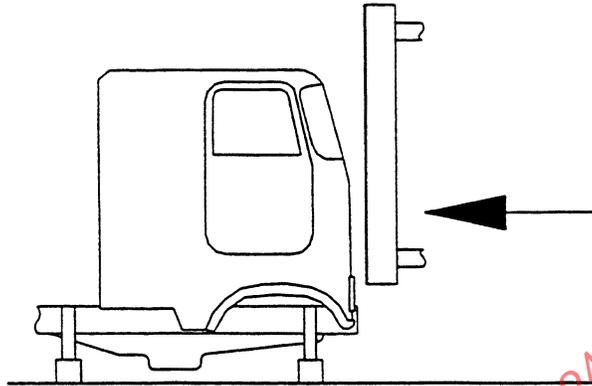


FIGURE 1—COE FRONTAL STRENGTH TEST CONFIGURATION

- 4.1 **Cab Mounting**—The cab shall be evaluated with its standard cab mounts. The cab mounts shall either be mounted to the vehicle's stock frame rails or to a simulated chassis that locates the cab mounts in their standard location and orientation. If testing is conducted using actual frame rails, the frame rails shall be rigidly attached to the ground. The forward attachment to the ground shall be not less than 15 cm (6 in) rearward of any front bumper or cab-mounting hardware. If a simulated chassis is used, it shall not deform during the test. Hardware used to attach the cab mounts to the simulated chassis shall be the same type and strength as the standard hardware used to attach the cab mounts to the standard chassis.

Cab mounts employing pneumatic ride control should be pressurized to produce the manufacturer recommended ride height.

If the influence of the engine is to be included in the evaluation, it must be attached to the frame rails or simulated chassis with the stock-mounting hardware. Space should be provided to allow for movement of the engine and transmission without interference with the test fixture or simulated chassis.

If the vehicle always includes a body or other structural member that will influence its rearward longitudinal motion, the body or structure may be included on the simulated chassis. Care should be taken to insure that only the structural members always on the vehicle provide the load path to ground. Test fixtures should not influence the motion of the vehicles standard equipment.

- 4.2 **Platen**—A rigid platen simulates the rear of a heavy-truck trailer. The height of the bottom of the platen is defined by the position on the cab that would first contact the lower structure of a trailer. For the vehicle at curb conditions, the position on the front of the cab 117 cm (46 in) above the ground defines the height of the platen. This is illustrated in Figure 2. The platen should be tall and wide enough so that the entire front of the cab is engaged, up to a width of 259 cm (102 in). The face of the platen is to be covered with a 19-mm (3/4-in) thick layer of plywood.

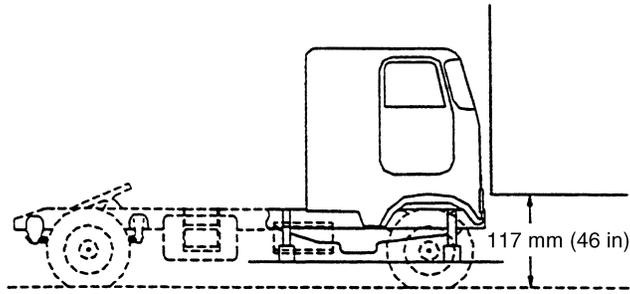


FIGURE 2—VERTICAL POSITION OF PLATEN CONTACT

The platen is guided so that it remains vertical throughout the test. It shall also be restrained so that it cannot translate vertically or laterally more than 13 mm ($\pm 1/2$ in).

5. **Instrumentation**—To record the load applied to the cab structure, load cells shall be used to mount the platen to its supporting structure. The displacement of the platen shall also be recorded as it is forced into the cab. To identify the amount of cab crush as part of the total platen displacement, the longitudinal displacement of the lower rear cab should be recorded. To quantify the amount of intrusion of the crush into the occupant compartment, longitudinal displacement of the steering wheel hub, header, and lower dash at the lateral position of the driver seat centerline should be measured. Any other locations of potential interest for cab intrusion should also be measured.
6. **Photographic Documentation**—For the quasi-static tests described previously, real-time film or video cameras are recommended. The field of view of these cameras should be large enough to document the entire cab. Provision should be made for synchronizing electronic and photographic instrumentation. Wherever possible, the cameras should be mounted such that they are perpendicular to the axis of platen motion.
7. **Performance Requirements**—This test procedure is for the purpose of informational studies only and is not an alternative to SAE J2420 due to the lack of a prescribed magnitude of load applied to the front of the vehicle.

During the test, components attaching the cab to the chassis frame may become distorted or broken, but the cab shall remain attached, and in an orientation similar to the original.

None of the doors shall open during the tests, but the doors shall not be required to open after testing.

To evaluate the occupant volume in the cab the manikin defined in ECE Regulation 29 can be used.

8. Notes

- 8.1 **Marginal Indicia.** The change bar (I) 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.

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