



MINIMUM PERFORMANCE CRITERIA FOR ROLL-OVER PROTECTIVE STRUCTURE FOR MOTOR GRADERS—SAE J396

SAE Recommended Practice

Report of Construction and Industrial Machinery Technical Committee approved July 1969.

1. Objective—The static laboratory test will provide the testing agency with a means of testing for structural adequacy of a roll-over protective structure (ROPS) design.

2. Scope—The static laboratory test will test the adequacy of the structures used to protect the operator during the following operation: Vehicle operating 0-10 mph over hard clay where roll-over would be limited to 360 deg down a slope of 30 deg maximum.

This criteria applies to graders classified as construction equipment.

3. Facilities and Apparatus

3.1 Facilities

3.1.1 Material, equipment, and tie-down means adequate to insure that the ROPS and its vehicle frame absorb the applied energy shall be provided.

3.1.2 Equipment necessary to measure and apply loads to the ROPS is required. Adequate means to measure deflections and lengths should also be provided.

3.1.3 Typical, but not mandatory, test setups are shown in Figs. 1 and 2.

3.2 Apparatus

Means to Measure	Accuracy
Deflection of ROPS, in. Vehicle weight, lb Force applied to frame, lb Dimensions of critical zone, in.	±5% of deflection measured ±5% of the weight measured ±5% of force measured ±0.5 in.

4. Vehicle Condition—The ROPS to be tested must be attached to the vehicle structure in the same manner as it will be attached during vehicle use. A totally assembled vehicle is not required. However, the vehicle structure and frame which support the ROPS must represent the actual vehicle installation. All normally detachable windows,

panels, or nonstructural fittings shall be removed so that they do not contribute to the strength of the ROPS.

5. Procedure

5.1 General

The test procedure shall consist of the following in the order listed:
5.1.1 Verify energy absorbing capabilities of ROPS when loaded laterally by incrementally applying a distributed load to the longitudinal outside top member of the ROPS, as shown in Fig. 1. The distributed load will be applied so as to result in approximately uniform deflection of the ROPS. The load increments should correspond with approximately 0.5 in. ROPS deflection increment in the direction of the load application, measured at the ROPS top edge. Should the operator's seat be off-center, the load shall be applied on the off-center side. For each applied load increment, plot total load (lb) versus corresponding deflection (in.) and calculate the area under the load-deflection curve. This area is equal to the energy (in.-lb) absorbed by the ROPS. For a typical load-deflection curve and calculation method, see Fig. 3.

Continue incremental loading until ROPS has absorbed the amount of energy and the minimum applied load specified under paragraph 6.2.1 has been reached or surpassed.

5.1.2 To cover the possibility of the vehicle coming to rest on its top, verify the support capability by applying a distributed vertical load to the top of the ROPS so as to result in approximately uniform deflection (see Fig. 2). Load magnitude is specified in paragraph 6.2.2.

5.1.3 Verify the low temperature impact strength of the material used in the ROPS by suitable material tests or material certification.

6. Performance Requirements

6.1 General

6.1.1 No repairs or straightening of any member shall be carried out between each prescribed test.

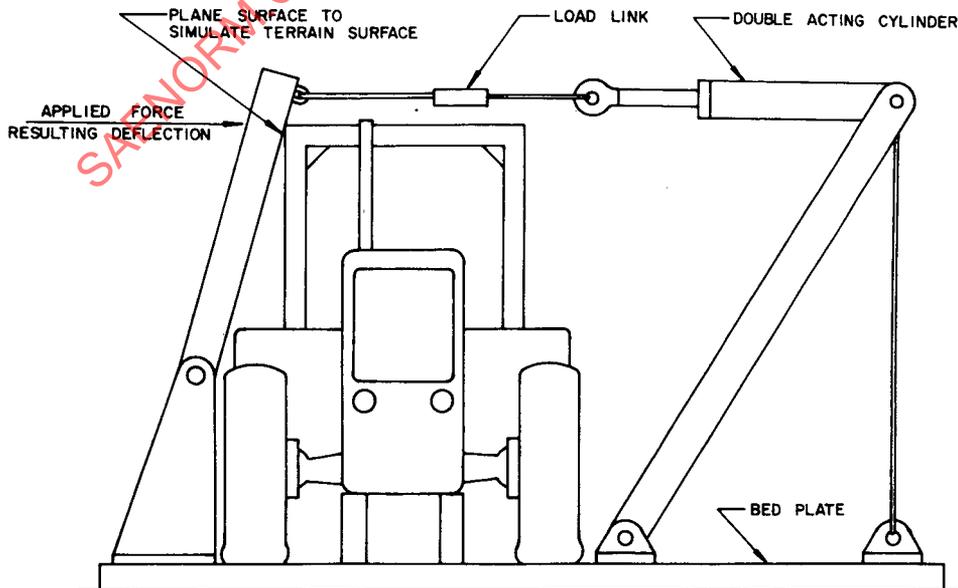


FIG. 1—TEST SETUP