



Pickup Box Stake Pocket Strength

1 Scope

Note: Nothing in this standard supercedes applicable laws and regulations.

Note: In the event of conflict between the English and domestic language, the English language shall take precedence.

1.1 Purpose. To evaluate the strength of Pickup Box (PUBX) stake pockets, flareboard, and side panels when subjected to lateral and vertical loads.

1.2 Foreword. Not applicable.

1.3 Applicability. This test applies to all light trucks utilizing Pickup Box stake pockets.

2 References

Note: Only the latest approved standards are applicable unless otherwise specified.

2.1 External Standards/Specifications.

None

2.2 GM Standards/Specifications.

None

2.3 Additional References.

- CG190 – GM Evaluation Report Template
- Subsystem Technical Specifications (SSTS)

3 Resources

3.1 Facilities. An approved GM certified test laboratory with an adequate bedplate or equivalent work surface necessary for mounting test samples and associated fixtures.

3.1.1 Calibration. The test facilities and equipment shall be in good working order and shall have a valid calibration label.

3.1.2 Alternatives. Alternative test facilities and equipment may also be used. However, all measuring variables as specified in this standard shall be determined correctly with respect to their physical definition.

3.2 Equipment.

3.2.1 Load Beam 1. Steel bar of length equal to the depth of the stake pocket plus the length above the flareboard as specified in the Subsystem Technical Specification (SSTS). The cross section of the steel bar shall be of such dimension that the beam fits securely into each stake pocket allowing minimal clearance between the bar and stake pocket opening. Refer to Appendix A, Figures A1 through A3.

3.2.2 Load Beam 2. Steel bar the length of the stake pocket depth plus a minimum of 25 mm above the flareboard. Refer to Appendix A, Figure A1.

3.2.3 An actuator (capable of pivoting at its restrained end) to apply the specified loads, plus a clevis or other fitting to attach to the appropriate load beam.

3.2.4 Load cell(s) with a minimum capacity of approximately 1.5 times the specifications for the various loads and orientations, compatible with 3.2.3 and 3.2.6.

3.2.5 Displacement measuring devices, compatible with 3.2.6.

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November 2013

Page 1 of 9

3.2.6 Data acquisition system to record load versus displacement curves.

3.2.7 Various stanchions or other structural metal framing for mounting/securing the PUBX, the actuator, and the displacement transducers.

3.3 Test Vehicle/Test Piece. Complete PUBX with all hardware, including an operational tailgate.

3.4 Test Time.

Calendar time:	1 day
Test hours:	4 hours
Coordination hours:	4 hours

3.5 Test Required Information.

3.5.1 Performance Objectives. The requesting engineer should provide specifications appropriate for the pickup box being evaluated. If possible, analysis techniques should be used to identify areas surrounding the stake pockets with the weakest structure, in order to reduce the number of required evaluations.

3.5.2 The following specifications may be needed:

3.5.2.1 Maximum applied load.

3.5.2.2 Load apply directions.

3.5.2.3 Load apply height.

3.5.2.4 Maximum displacement and permanent set.

3.6 Personnel/Skills. Prior experience in setting up and running similar tests, and experience in the use of the referenced test equipment, is critical to achieving the estimated times shown in 3.4.

4 Procedure

4.1 Preparation.

4.1.1 The release and test engineer should inspect the PUBX assembly to ensure that all material listed in 3.3 are present and assembled properly. Observe and note all areas of damage or scratches to the flareboard, and the surrounding structures of each stake pocket.

4.1.2 Pickup box shall be rigidly supported at the design intent PUBX to frame attachment locations and constrained to the test bedplate.

4.1.3 Place tailgate in the fully latched position.

4.1.4 Install the load actuator, load and displacement measurement devices, and actuator support fixtures with minimal alterations to the test sample. For Load Case 1, the load actuator should be pivoted to allow it to rotate within the lateral plane.

4.1.5 Additional lateral displacement measurements may be required on the side inner panel at the discretion of the requesting engineer. If needed, mount the displacement devices, e.g., Linear Variable Displacement Transformer (LVDT) dial indicator, etc., to measure the lateral movement of the inner panel at specified locations.

4.2 Conditions.

4.2.1 Environmental Conditions. As specified in the SSTS. If not dictated, default to ambient conditions.

4.2.2 Test Conditions. Deviations from the requirements of this standard shall have been agreed upon. Such requirements shall be specified on component drawings, test certificates, reports, etc.

4.3 Instructions.

4.3.1 Load Case 1 - Lateral Loading.

4.3.1.1 Place Load Beam 1 into stake pocket such that the beam rests against the bottom surface of the stake pocket.

Note: The beam may have some lateral movement due to the stake pocket dimensions being greater than the stake pocket opening.

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November 2013

Page 2 of 9

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4.3.1.2 Attach the load actuator to Load Beam 1 utilizing a clevis attachment, spherical rod end, or eyebolt, so that a horizontal load is applied to the beam at the distance above the flareboard as specified in the SSTs. If utilizing a displacement measuring device not integral to the load actuator, e.g., string pot, mount the device to the load beam so that displacement is measured along the line of load application.

4.3.1.3 Zero the load and displacement measurement devices for a load applied in the outboard direction.

Note: The angle between the actuator centerline and the beam may not be perpendicular.

4.3.1.4 Gradually apply the specified outboard load as specified in the SSTs while recording load and displacement. Hold the load for approximately 5 s. Then gradually reduce the load to zero (0). Refer to Appendix A, Datasheet A2 for a sample.

4.3.1.5 Note any yield or permanent deformation to the stake pocket, flareboard, or side wall.

4.3.1.6 If requested by release engineer or specified in specific program SSTs, utilizing the same stake pocket, zero the load and displacement measuring devices for a load applied in the inboard direction. Also zero the plotter to record the load versus displacement.

Note: The angle between the actuator centerline and the beam may not be perpendicular.

4.3.1.7 Gradually apply the specified inboard load as specified in the SSTs while recording load and displacement. Hold the load for approximately 5 s. Then gradually reduce the load to zero (0). Refer to Appendix A, Datasheet A2 for a sample.

4.3.1.8 Note any yield or permanent deformation to the stake pocket, flareboard, or side wall.

4.3.1.9 Repeat 4.3.1.1 through 4.3.1.8 for all other stake pockets on the same side of the PUBX.

4.3.2 Load Case 2 – Vertical Loading.

4.3.2.1 On the side of the PUBX opposite that was used for lateral loading, place Load Beam 2 into stake pocket such that the beam rests against the bottom surface of the stake pockets.

Note: The beam may have some lateral movement due to the stake pocket opening.

4.3.2.2 Attach the load actuator to Load Beam 2 utilizing a clevis or flat plate so that the load is applied to the beam in a purely vertical direction. If utilizing a displacement measuring device not integral to the load actuator, e.g., string pot, mount the device to the load beam so that displacement is measured along the line of load application. Zero the load and displacement measurement devices for a load applied in the vertical direction.

4.3.2.3 Gradually apply the specified vertical load as specified in the SSTs while recording load and displacement. Hold the load for approximately 5 s. Then gradually reduce the load to zero (0). Refer to Appendix A, Datasheet A2 for a sample.

4.3.2.4 Note any yield or permanent deformation to the stake pocket, flareboard, or side wall.

4.3.2.5 Repeat 4.3.2.1 through 4.3.2.4 for all other stake pockets on the same side of the PUBX.

5 Data

5.1 Calculations. Not applicable.

5.2 Interpretation of Results. Permanent set or yield is determined by a net positive difference between the displacement at the point of load application recorded at the preload value at the beginning of the test sequence and the displacement at the point of load application recorded at the preload value after application of 100% of the required load.

5.3 Test Documentation. Provide load versus actuator displacement plots for each vertical and lateral evaluation conducted presented as data sheets for each surface evaluated. See Appendix A, Datasheet A2 for a sample.

5.4 Test Report Format. The final test report shall be presented in a format consistent with the GM Evaluation Report Template (CG190).

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November 2013

Page 3 of 9

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