



Curb Bumping - Lateral Impact

1 Introduction

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. The purpose of this procedure is to determine failure modes or determinable damage, if any, of the vehicle corner components when subjected to an integrity test simulating a severe lateral vehicle-to-curb impact.

1.2 Applicability. This test procedure applies to all passenger cars, light duty trucks and multi-purpose vehicles.

1.3 Remarks This procedure may be used to test front or rear corners of the vehicle. The vehicle corner components or assemblies may be evaluated for visible damage, change in fastener torque, relative movement, and/or alignment. The bearing assembly may be evaluated for Brinelling.

This procedure includes a remove and replace instruction for the wheel bearing assembly after specified low speed impact(s). The removed bearing(s) will be analyzed for Brinelling. The wheel bearing data and the impact force data will be used for correlation with laboratory bearing tests and/or math based modeling for bearing Brinelling.

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 Evaluation Report Template (ID)

(ID) = This document is limited to internal use within General Motors and shall not be accessed outside this company. Contact the GM Lead Engineer for further instructions.

3 Resources

3.1 Facilities.

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.

3.1.3 Milford Proving Ground Low Speed Tow System Facility or equivalent.

3.1.4 Vehicle scale capable of measuring the weight at each vehicle corner and ballast.

3.2 Equipment.

3.2.1 Adjustable curb test fixture and transducer element for measuring curb impact forces.

3.2.2 Curb transport device, referred to as a cart.

3.2.3 Data recording equipment to record force levels imparted to curb during impact tests.

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3.2.4 Marking tools, such as prick-punch, hammer, scribe, and measurement scale in 0.5 mm divisions for location marking of corner components, if requested.

3.2.5 Photographic equipment as required.

3.2.6 All instrumentation is to be calibrated as required. Document instrumentation details and calibration dates unless information is otherwise preserved in the test records (see Appendix A, Data Sheet A1).

3.3 Test Vehicle/Test Piece.

3.3.1 The test vehicle should be representative of the vehicle platform with respect to all suspension mounting, trim height, vehicle mass, axle assembly, and corner components.

3.3.2 The vehicle should be built with the requested test components. Assure that all test components are within manufacturer's specifications, as specified by the requesting engineer.

3.3.3 A minimum of three (3) wheel bearing assemblies for each test corner will be required when testing for wheel bearing Brinelling.

3.3.4 Test wheels and tires, and other optional corner components, should be specified by the requesting engineer.

3.4 Test Time. Time required to run one (1) impact (including removal of fuel from vehicle tank, loading of sled, test setup, parts marking, impact, and inspections) = 4 h.

Total time with the vehicle will depend on the number of impacts requested for the corner, the number of corners to be tested, and the number of corner builds to be tested.

3.5 Test Required Information.

3.5.1 This procedure may be modified as needed. The procedure may be used for suspension/steering integrity only, wheel bearing Brinelling only, or suspension/steering and wheel bearing tests.

3.5.2 If this procedure is used to only test for wheel bearing Brinelling, the procedure may be terminated after the requested low speed impacts have been completed. Marking of the suspension components may not be required. However, careful examination of the corner at end of test should be done to determine which, if any, corner components need replacement following the impacts, unless the vehicle is to be scrapped immediately after test.

3.6 Personnel/Skills. Test personnel shall be trained and qualified to perform this procedure.

4 Procedure

4.1 Preparation.

Note: Perform the items in this section for each test corner.

4.1.1 Inspect test vehicle for any damage to, or other unusual characteristics of, the front or rear suspension, steering, cradle/frame, axle assembly, body components, or brake assemblies. Correct as required.

4.1.2 Install test components and torque all fasteners to maximum specification. Record the initial torque levels in the test record. Refer to Appendix A, Data Sheets A1 and A2. See Table 1 and Appendix A, Figure A1 for a list of typical fasteners. Modify the list as required for the suspension components of the test vehicle.

4.1.3 Document test information and vehicle information (see Appendix A, Data Sheet A3).

4.1.4 Document manufacturer's specifications for the suspension toe setting, caster (if applicable), camber, and (optional) wheel lateral run-out. Adjust test vehicle to the manufacturer's mean specifications and document settings.

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Table 1: Typical Fasteners of Interest

Item	Description
(a)	Control arm mounting bolts
(b)	Upper ball joint
(c)	Lower ball joint
(d)	Steering rack/gear to frame/body
(e)	Outer tie rod to knuckle
(f)	Inner tie rod mounting bolt
(g)	Engine cradle bolts
(h)	Wheel hub to knuckle
(i)	Strut/shock absorber to knuckle
(j)	Strut/shock absorber mount to frame/body
(k)	Strut/shock absorber to frame/body
(l)	Rear axle links to axle (multi-link)
(m)	Rear axle links to frame (multi-link)
(n)	Leaf spring clamps (solid axle)

4.1.5 Check and document the vehicle's front "Z" heights and/or the rear "D" heights at the loaded test weight. Heights must be within manufacturer's specifications. Correct by changing springs as required. Do not shim springs.

Note: Z = Front Vehicle Height Dimension Designation and D = Rear Vehicle Height Dimension Designation. A general example for locating the heights is in Appendix A, Figure A1. Consult the requesting engineer for exact location for measurements.

4.1.6 On areas of interest, scribe adjacent parts for relative movement and prick-punch marks along the parts to show bending. Record locations and dimensions in the test record. Unless specified by the requesting engineer, the location(s) of these markings are left to the discretion of the test engineer.

4.1.7 Inflate tires to manufacturer's recommended pressure for Gross Vehicle Weight Rating (GVWR).

4.1.8 Load vehicle to GVWR, as specified in the test request. Measure and document total vehicle weight and each corner weight.

4.1.9 Install instrumentation.

4.1.10 Drain fuel.

4.2 Conditions.

4.2.1 Environmental Conditions. Not applicable.

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 Deliver vehicle to the Low Speed Tow System Facility and place perpendicular to the travel of the cart.

Note: Make sure vehicle is set up on a bare concrete surface not a painted floor surface. The painted surface will affect the coefficient of friction of the test.

4.3.2 Line up the vehicle parallel to the curb on the cart. The corner of the vehicle to be impacted should be specified by the requesting engineer. Vehicle should be positioned such that the impact line of force is approximately aligned with pivot center of curb. Tighten curb securely in place.

Note: Some suspensions are not symmetrical. The geometry could affect load paths, and both sides may need to be run.

4.3.3 Move cart away from curb impact site. Ballast cart to weight of vehicle. Record cart weight in test record.

Note: Cart on which curb is mounted may not be able to be weighted to the Gross Vehicle Mass Rating (GVMR) of some light duty trucks. Load to maximum capacity and record weight of cart as loaded for testing.

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