



Suspension Lateral Loading Durability

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. This test evaluates the durability characteristics of suspension components (including frame and body), when subjected to either constant amplitude or programmed tire patch lateral loading.

1.2 Applicability. Passenger cars and light trucks.

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 Writing Template
Subsystem Technical Specification (SSTS)

3 Resources

3.1 Facilities. Bedplate area large enough to install the complete front or rear section of a vehicle.

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 Application. Two (2) servo hydraulic actuators capable of achieving required loads and displacements.

3.2.1.1 Two (2) hydraulic control consoles to control actuators.

3.2.1.2 One (1) computer hydraulic site controller to input the load program to the hydraulic control console.

3.2.2 Fixturing. Four (4) angle stands and four (4) adjustable angle stand brackets.

3.2.2.1 Two (2) A-frame or wire rope supports to hold steering knuckle at design height.

3.2.2.2 Two (2) rolling radius loading arms used to apply lateral loads at the tire patch.

3.2.2.3 Floor stands to mount the loading cylinders at tire patch height.

3.2.2.4 One (1) steering gear, linkage, and attaching parts for front suspension testing.

3.2.3 Instrumentation. Suitable instrumentation to monitor load cell output during the test.

3.2.3.1 Two (2) load cells rated for the appropriate tire patch loads.

3.3 Test Vehicle/Test Piece. Three (3) complete suspensions, including frames or body section.

GM Confidential

© Copyright 2017 General Motors Company All Rights Reserved

April 2017

Page 1 of 6

3.4 Test Time.

Calendar time: 30 days

Test time: 20 h

Coordination time: 15 h

3.5 Test Required Information. Not applicable.**3.6 Personnel/Skills.**

3.6.1 One (1) laboratory test technician skilled in the set up, tuning, and use of hydraulic test equipment and controllers.

3.6.2 One (1) test engineer for test planning, direction, and incident analysis.

3.6.3 One (1) validation engineer to help acquire material from the release engineer, plan test timing, and determine test sample size requirements and the number of lives for each sample.

4 Procedure**4.1 Preparation.**

4.1.1 Load Determination. For constant amplitude testing, the lateral inboard test load is calculated as follows:

$$*F_i = 0.8 \left[\frac{W_f}{2} + \frac{.8 W_f H}{T} \right]$$

Where:

F_i = Lateral inboard tire patch load (Newtons).

W_f = Vehicle maximum axle weight (Newtons).

T = Vehicle front track width (millimeters); defined as the distance measured between the center of the right tire tread and the left tire tread.

H = Height of vehicle center of gravity above ground (millimeters).

The lateral outboard test load is calculated as follows:

$$*F_o = 0.7 \left[\frac{W_f}{2} - \frac{.8 W_f H}{T} \right]$$

Where:

F_o = Lateral outboard tire patch load (Newtons).

Both F_i and F_o are alternately applied on each wheel. A load cycle is defined as the application of F_i to side A while simultaneously applying F_o to the opposite side, followed by the application of F_o to side A while simultaneously applying F_i to the opposite side.

4.1.1.1 For programmed load testing, the lateral loads are calculated as in 4.1.1.1.1 thru 4.1.1.1.7.

4.1.1.1.1 Strain gage both right and left knuckles to read strain for lateral load inputs. Wheel force transducers in lieu of strain gaged knuckles can also be used to measure lateral load inputs.

4.1.1.1.2 Check gages for non-sensitivity in the vertical and fore/aft loading directions.

4.1.1.1.3 Calibrate gages by making lateral load vs. strain plots for each gage.

4.1.1.1.4 Install knuckles or wheel transducers on a Proving Ground vehicle.

4.1.1.1.5 Record strain from gages while vehicle is driven on the appropriate Proving Ground Roads.

4.1.1.1.6 Convert the strain data to load data and reduce the load data to real time drive files.

4.1.1.1.7 Use the drive computer files to conduct the test.

GM Confidential

© Copyright 2017 General Motors Company All Rights Reserved

April 2017

Page 2 of 6



Documents
Document Sharing Hub