GM	WORLDWIDE ENGINEERING STANDARDS	Test Procedure	GMW17401

Hill Start Assist System Performance

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 standard is to determine the performance of a vehicle equipped with a Hill Start Assist (HSA) or Extended Hold Hill Start Assist (EHHSA) system. This standard may be used for development or validation of requirements within the GM Vehicle Technical Specification (VTS) and for regional regulations.

Six (6) different technical conditions of the hill start assist system are considered: HSA Driver Exit, HSA Door Seatbelt Validity, EHHSA Driver Exit, EHHSA Door Seatbelt Validity, EPB Interface and EHHSA Enabled/Disabled.

1.2 Applicability. This standard is applicable for vehicles equipped with the HSA or EHHSA systems.

1.3 Remarks. Not applicable.

2 References

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

2.1 External Standards/Specifications.

None

2.2 GM Standards/Specifications.

GMW16424 (ID)

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

2.3 Additional References.

- CG4075, Hill Start Assist and Extended Hold Hill Start Assist Functional Checkout
- Electrical Subsystem Technical Specification (SSTS), Electronic Brake Command Module (EBCM)
- Vehicle Technical Specification (VTS)

3 Resources

3.1 Facilities. Test is to be conducted on a 12% incline grade surface, such as the Vehicle Dynamics Test Area (VDTA) at the Milford Proving Ground (MPG), or any other applicable surface.

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. Appropriate equipment capable of monitoring and recording the following signals:

3.2.1 Left front, Right front, Left rear, and Right rear brake caliper pressure.

3.2.2 Serial data $2F9_HS Brake System Hill Start Assist Status and $214_HS Hill Start Assist Active Indication On.

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3.2.3 Serial data $230_HS Electric Park Brake (EPB) Status, EPB System Brake Lights Requested, EPB System Status.

3.2.4 Serial Data $140_HS Brake Lights Active.

3.2.5 Serial Data $17D_HS Brake System Brake Lights Requested.

3.2.6 Serial Data $0F1_HS Brake Pedal Position, Brake Pedal Initial Travel Achieved.

3.2.7 Serial Data $0C9_HS Accelerator Actual Position.

3.2.8 Serial Data $12A_HS Driver Door Ajar Switch active, Driver Door Ajar Switch Active Mask, Driver Seatbelt Attached, Driver Seatbelt Attached Validity.

3.3 Test Vehicle/Test Piece. See Procedure section.

3.4 Test Time.

Calendar time:	2 days
Test time:	4 hours
Coordination time:	1 day

3.5 Test Required Information. Possible sources are: Electronic Brake Command Module (EBCM) Subsystem Technical Specification (SSTS).

3.6 Personnel/Skills. Chassis controls engineer certified to run braking tests.

4 Procedure

4.1 Preparation.

4.1.1 Build or verify the test vehicle with the HSA or EHHSA. Record vehicle and brake system information in the test record (see Appendix A, Data Sheet A1). The vehicle to be tested must be in safe operating condition. Condition of tire, brake and suspension components should be inspected carefully. All vehicle safety equipment must be in proper operating condition.

4.1.2 Inflate tires to manufacturer's recommended pressure or per test engineer's instructions.

4.2 Conditions.

4.2.1 Environmental Conditions. Dry asphalt test surfaces are required.

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. Follow the instructions and record vehicle reactions according to CG4075.

5 Data

5.1 Calculations. Not applicable.

5.2 Interpretation of Results. Results of vehicle reactions from testing and any comments are recorded in CG4075.

5.3 Test Documentation. The vehicle information, test information and test results shall be published following GM corporate protocol using the Evaluation Report template and the approved engineering document management system/repository. Contact the GM Lead Engineer for further instructions.

6 Safety

This standard may involve hazardous materials, operations, and equipment. This standard does not propose to address all the safety problems associated with its use. It is the responsibility of the user of this standard to establish appropriate safety and health practices and determine the applicability of regulatory limitations prior to use.

In general, a risk assessment needs to be performed for every driving instruction prior to executing this standard. (**Note:** National law needs to be considered while performing a risk assessment.) The required rating of risk by exposure probability and possible violation will be done in a separate document. Every identified risk must be named inside the risk assessment for the relevant driving instruction in order to announce that risk to employees.

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