



EBCM Hydraulic Fade Compensation 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 verify the performance and functional operation of the Electronic Brake Command Module (EBCM) Hydraulic Fade Compensation. Hydraulic Fade Compensation will apply additional brake pressure above driver requested brake pressure during brake fade test conditions.

1.2 Applicability. This standard is applicable for vehicles equipped with the EBCM Hydraulic Fade Compensation.

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.

None

2.3 Additional References.

- CG4753 EBCM Hydraulic Fade Compensation Performance
- Electronic Brake Command Module (EBCM) Subsystem Technical Specification (SSTS)

3 Resources

3.1 Facilities. Test is to be conducted on a vehicle dynamics test area surface to allow frequent brake stops without surrounding traffic, such as the Vehicle Dynamics Test Area (VDTA) located at the Milford Proving Ground (MPG), or any other applicable test facility.

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. Production representative vehicle with up to date EBCM software and calibration.

3.2.1 Brake pressure sensors at each corner of the vehicle.

3.2.2 Longitudinal accelerometer to measure vehicle deceleration.

3.2.3 Brake lining thermocouples at each corner of the vehicle

3.2.4 Data acquisition system capable of measuring brake corner pressure sensors, longitudinal acceleration, brake corner temperatures, and collecting data from vehicle serial data bus such as EBCM master cylinder brake pressure, EBCM vehicle deceleration, EBCM vehicle reference speed, wheel speeds, and ABS active.

3.2.5 EBCM supplier instrumentation to monitor brake temperature estimate and hydraulic fade compensation status.

3.3 Test Vehicle/Test Piece. See Section 4.

3.4 Test Time.

Coordination time: 1 day

Instrumentation time: 1 day

Test time: 2 days

3.5 Test Required Information. Calibration values described in CG4753.

3.6 Personnel/Skills. Chassis controls engineer.

4 Procedure

4.1 Preparation.

4.1.1 Build, instrument, and verify the test vehicle with functioning EBCM Hydraulic Fade Compensation.

4.2 Conditions.

4.2.1 Environmental Conditions. Dry VDTA test surface is required where driver can control vehicle speed and verify status of Hydraulic Fade Compensation.

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 CG4753.

5 Data

5.1 Calculations. Not applicable.

5.2 Interpretation of Results. Results of vehicle reactions from testing and any comments are recorded in CG4753.

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.

6 Safety

This Engineering Standard may involve safety requirements for hazardous materials, the method of operations and equipment. This standard does not propose to address all the safety issues associated with its use. It is the responsibility of the user of this standard to ensure compliance with all appropriate safety and health practices. This would include any specific training that may be required. The safety and health standards include site specific rules and procedures, company rules and procedures, and Government Standards. Contact shall be made with the appropriate site Safety and Health personnel for further direction and guidance in these matters.

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. Within the risk assessment, the vehicle equipment and different vehicle build stages have to be considered. After performing a risk assessment, non-acceptable risk needs to be mitigated by appropriate countermeasures. Here technical measures are preferred because these are independent from attendant circumstances. In case technical measures are not appropriate, organizational and/or personal measures will apply. This includes training, wearing of Personal Protection Equipment, or arrangement of idle time.

6.1 Safety Precautions.