



Heads-Up Display Image Stability Test

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 validate the Heads-Up Display (HUD) image stability on the windshield by running a vehicle level test while driving under various types of road.

1.2 Applicability. This standard applies to all passenger vehicles equipped with HUD content. If nothing about model is stated, assume that the instructions apply to all models.

1.3 Remarks. This standard is a performance test that can be used for vehicle level validation purposes. This test will use the subjective rating scale procedure GMW14264.

2 References

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

2.1 External Standards/Specifications.

None

2.2 GM Standards/Specifications.

GMW14264

2.3 Additional References.

Not applicable.

3 Resources

3.1 Facilities.

GM Approved Proving Ground 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.

3.2 Equipment.

Not applicable.

3.3 Test Vehicle/Test Piece. Tests should be conducted with vehicles equipped with production design intent components mounted in the production design intent instrument panel. Any deviations from this should be noted on Data Sheet A1 in Appendix A. The supplier shall work with the GM Design Responsible Engineer to comprehend these requirements.

3.4 Test Time.

Calendar time: 1 d

Test time: (4 to 6) h

Coordination time: (1 to 2) h

3.5 Test Required Information. Complete HUD Image Drive Test using Data Sheet A1 in Appendix A. The supplier shall work with the GM Design Responsible Engineer to comprehend these requirements.

3.6 Personnel/Skills. Test personnel must be certified to drive on a GM proving ground facility.

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4 Procedure

4.1 Preparation. Verify electrical connections and check for proper operation of electrical components.

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. Sit on the driver side and adjust driver seat to a comfortable position prior to performing this test.

4.3.2 Turn ignition ON. Obtain a good view of the HUD image by adjusting the image height adjuster and display intensity. The entire HUD image must be visible.

4.3.3. Start the vehicle, drive vehicle at city speed 40 km/h to 55 km/h (25 mph to 35 mph) over smooth concrete to develop a baseline comparison for other tests. Verify that no perceivable image movement is observed.

4.3.4 Drive vehicle at city speed 40 km/h to 55 km/h (25 mph to 35 mph) over spalled concrete, and verify that any perceivable image movement observed is very small in amplitude, lasts for a very brief period, and is hardly perceivable compared to the base line test result.

4.3.5 Drive vehicle at city speed 40 km/h to 55 km/h (25 mph to 35 mph) over concrete divider strips, and verify that any perceivable image movement observed is very small in amplitude, lasts for a very brief period and is hardly perceivable compared to the base line test result.

4.3.6 Regional.

4.3.6.1 Europe. Repeat 4.3.3 to 4.3.5 at highway speed 72 km/h to 121 km/h (45 mph to 75 mph) over smooth concrete, spalled concrete, and concrete divider strips. In addition, repeat 4.3.3 to 4.3.5 at highway speed 121 km/h to 180 km/h (75 mph to 112 mph) over smooth concrete (Autobahn).

4.3.6.2 North America. Repeat 4.3.3 to 4.3.5 at highway speed 72 km/h to 121 km/h (45 mph to 75 mph) over smooth concrete (Circle Track), spalled concrete, and concrete divider strips.

5 Data

5.1 Calculations. Not applicable.

5.2 Interpretation of Results. Not applicable.

5.3 Test Documentation. Record any abnormalities during the test and provide copies of the test data sheet along with comments to the requester for record and problem solving purposes.

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.

7 Notes

7.1 Glossary.

Heads-Up Display (HUD): A functional subsystem designed to allow the driver to view information such as vehicle speed, turn signal indicators, radio frequency, etc., at eye level in the windshield.

HUD Dimmer: A switch that allows the driver to adjust the display light intensity.

Image Height Adjustment: A knob, button, or stalk that is used to adjust the position of the display image on the windshield.

Intensity: Refers to the brightness of the display.

Spalled Concrete: Refers to concrete that is rough with exposed aggregate.

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