



Heated Backlight Feature Level Test Procedure

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. To verify backlight heat grids meet the Feature Technical Specification.

1.2 Applicability. To all vehicles with heated back windows. This standard applies to passenger cars, and to multipurpose passenger vehicles, trucks, and buses of 4536 kg gross vehicle mass (weight) rating or less with a Heated Back Window System as defined in the Vehicle Technical Specifications (VTS).

1.3 Remarks. This standard tests the performance requirements of a Heated Back Window. Not All procedure sections in this GMW are required for every program nor for every type of Heated Back Window. Refer to the program specific SSTs to confirm which procedures are required for the specific program. All applicable test procedure sections shall be on the Analysis/Development/Validation Plan and Report (ADVP&R). Electrical function and vehicle communication interface requirements are tested by other Electrical Function procedures. This document is the GM Worldwide Heated Back Window System Testing Standard. Its purpose is to establish a common test methodology for Heated Back Window systems to ensure that a high quality world class system is consistently developed and produced. This is a living document and any suggestions or revisions will be reviewed and/or updated annually by the Fixed Glass Global Subsystem Leadership Team (GSSLT).

2 References

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

2.1 External Standards/Specifications.

None

2.2 GM Standards/Specifications.

GMW3600

2.3 Additional References.

- CG180 Five Phase Template
- GM Security Guidelines
- Subsystem Technical Specifications (SSTs)
- Vehicle Technical Specifications (VTS)

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.

3.2 Equipment. Required for all tests.

3.2.1 Multimeter.

3.2.2 One set of interconnect leads/shielded alligator clips.

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3.2.3 A thin piece of a tin foil.

3.2.4 Stop Watch.

3.2.5 Thermal Chamber. Thermal chamber large enough to contain a vehicle and capable of -40 °C to 105 °C with controlled humidity. Thermal Chamber should also meet the following:

- Temperature Range (-40 °C to +105 °C) and continuously adjustable.
- Controlled humidity.
- Recirculating air temperature cabinet.
- Test room, suitable for the execution of the test.
- Permissible temperature accuracy: ± 3 °C.
- Explosion proof.

3.2.6 Digital camera.

3.3 Test Vehicle/Test Piece. Vehicle must have remote start capabilities.

3.4 Test Time.

Calendar time: 2 d
Test time: 14 h
Coordination time: 2 h

3.5 Test Required Information. Requirements from the Feature Technical Specification (FTS) or respective specification are necessary in order to execute test methods in this document. Equipment and test sample detail is included in Section 4 of this document.

3.5.1 Product Security. Security protocol for the test vehicle must be followed per GM Security Guidelines.

3.5.2 Notification. GM Validation shall be notified of test failures within 24 h period of occurrence.

3.5.3 Five (5) Phase. Supplier to develop five phase document for all test failures. GM 5 phase template is CG180.

3.6 Personnel/Skills. The test facility shall have sufficient personnel having the necessary education, training, technical knowledge, and experience for performing the required tests.

4 Procedure

4.1 Preparation. See individual procedures for preparation.

- Document the results in Data Sheet A1 provided in Appendix A.
- Use Data Sheet B1 in Appendix B: Check Sheet as an aid for test procedure.
- Record System Voltage before each test.
- One test engineer shall be seated in the driver's seat.
- Other test engineer shall raise the Trunk or Lift Gate if needed to get access to the positive and negative (ground) terminals of the backlight thermal grid.
- Put stop blocks in front of the wheels for safety.
- If in garage, hook up the exhaust to the exhaust fan.
- Configure the Rear Defog and Defrost Feature for a remote start, customize if not already done so through infotainment, through an ON/OFF soft button in the infotainment screen.
- Configure the Rear Defog and Defrost Feature time Out at 15 minutes. Customize if not already done so through the infotainment, it's an ON/OFF soft button in the infotainment.
- Configure the Rear Defog and Defrost Feature at the display screen to Defog and Defrost MANUAL/AUTO and select AUTO.
- To check for the voltage in the grids with the multimeter, wrap a thin tin foil on the positive lead of the multimeter and press against the resistance gridlines.

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- For Cold testing, hold the vehicle in the environmental chamber at $(-20\text{ }^{\circ}\text{C} \pm 2\text{ }^{\circ}\text{C})$ for at least 2 h prior to testing.
- For test procedures requiring less $< 5\text{ }^{\circ}\text{C}$ (Cal Value), soak the vehicle in the cold chambers for 2 h to 4 h until the outside Ambient Air $< 5\text{ }^{\circ}\text{C}$.
- If Outside Ambient Air $< 0\text{ }^{\circ}\text{C}$, the testing may be performed out in the open.
- For tests requiring the outside Ambient Air $> 5\text{ }^{\circ}\text{C}$, let the vehicle warm up in the ambient until the outside Ambient Air $> 5\text{ }^{\circ}\text{C}$ or may use a thermal chambers if necessary
- The **Inactive State**, by design, is defined by insufficient power and vehicle signal information to devices that provide electrical power to the Defog and defrost electrical grid.
- The **Enabled State**, by design, is defined by *available* power and vehicle signal information to provide electrical power to the Defog and defrost electrical grid.
- The **Active State**, by design, is defined by supplied power and vehicle signal information to provide electrical power to the Defog and defrost electrical grid.
- For vehicle in **Ignition**, do the following:

For Ignition Key Systems, apply the brakes, insert key in the ignition key cylinder and turn the key to start the ignition

For Push Button Systems, apply the brakes and push the Engine Start Button to start the ignition

4.1.1 Acceptance Criteria. See individual procedures for Acceptance Criteria (4.3.1 through 4.3.8).

4.2 Conditions.

- Ambient Air $< 5\text{ }^{\circ}\text{C}$.
- Ambient Air $> 5\text{ }^{\circ}\text{C}$.
- All tests in Ignition Mode shall be run at the system voltage.

4.2.1 Environmental Conditions. See individual procedures for Environmental Conditions.

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 Transition between Inactive, Enabled and Active States.

4.3.1.1 Purpose

- To verify that the Rear Defog and Defrost Feature shall not defog or defrost when Rear Defog and Defrost Switch was turned OFF or Ignition was turned OFF.
- To verify that Rear Defog and Defrost shall not Defog or Defrost until the Rear Defog and Defrost Switch was turned ON and Ignition was ON.
- To verify that there is no unintended activation or deactivation.

4.3.1.2 Equipment. See section 3.2.

4.3.1.3 Conditions. See section 4.2.

4.3.1.4 Preparation. See section 4.1.

4.3.1.5 Procedure.

4.3.1.5.1 Raise the Trunk Lid, Lift Gate or Lower the Rear Glass, if needed to get access to the positive and negative (ground) terminals of the Backlight thermal grid.

4.3.1.5.2 Locate the positive and ground/negative terminals of the grid.

4.3.1.5.3 Close the Trunk Lid/Lift Gate before running a test.

4.3.1.5.4 Power Mode Ignition OFF.

4.3.1.5.5 Check for the voltage in the grids with the multimeter. Record the response in Data Sheet A1, Appendix A, for Section 4.3.1.

4.3.1.5.6 Power Mode Ignition ON.

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4.3.1.5.7 Check for the voltage in the grids with the multimeter. Record the response in Data Sheet A1, Appendix A, for Section 4.3.1.

4.3.1.5.8 Set the Rear Defog Defrost Switch ON.

4.3.1.5.9 Check for the voltage in the grids with the multimeter. Record the response in Data Sheet A1, Appendix A, for Section 4.3.1.

4.3.1.6 Acceptance Criteria. Must meet VTS requirements.

- When Power Mode Ignition is OFF, The Rear Defog and Defrost Feature shall be in inactive state and shall show NO voltage reading.
- When Power Mode Ignition is ON and the Rear Defog Defrost Switch is OFF, the Rear Defog and Defrost Feature shall be in enabled state and show No voltage reading until Switch is turned ON.
- When Power Mode Ignition is ON and the Rear Defog Defrost Switch is ON, the Rear Defog and Defrost Feature shall be in active state and show voltage reading.

4.3.2 Remote Start when Outside Ambient Air < 5 °C.

4.3.2.1 Purpose.

- To verify that when vehicle is remote started and Outside Ambient Air < 5 °C, the Rear Defog and Defrost Feature shall transition from Enabled State to Active State.
- To verify that there is no unintended activation or deactivation.

4.3.2.2 Equipment. See section 3.2.

4.3.2.3 Conditions. See section 4.2.

4.3.2.4 Preparation. See section 4.1.

4.3.2.5 Procedure.

4.3.2.5.1 Configure the Rear Defog and Defrost Feature for a remote start, customize if not already done so through infotainment, through an ON/OFF soft button in the infotainment screen.

4.3.2.5.2 Soak the vehicle for 2 h to 4 h in the cold chambers until the ambient is < 5 °C as described in the Procedure in Section 4.

4.3.2.5.3 Raise the Trunk Lid, Lift Gate if needed to get access to the positive and negative (ground) terminals of the Backlight thermal grid.

4.3.2.5.4 Locate the positive and ground/negative terminals of the grid.

4.3.2.5.5 Close the Trunk Lid/Lift Gate before running the test.

4.3.2.5.6 Remote start the vehicle by using key fob.

Note: The vehicle will remote start and Rear Defog Defrost shall activate as ambient < 5 °C.

4.3.2.5.7 Check for the voltage in the grids with the multimeter. Record the response in Data Sheet A1, Appendix A for Section 4.3.2.

4.3.2.5.8 Alternate Case. When ambient is > 5 °C.

4.3.2.5.9 Allow vehicle to warm to > 5 °C and park in an area with ambient > 5 °C or use hot thermal chambers if necessary or let it warm in ambient room.

4.3.2.5.10 Repeat the test as above and record the response in Data Sheet A1, Appendix A for Section 4.3.2.

Note: The vehicle will remote start and Rear Defog Defrost shall NOT activate as ambient > 5 °C.

4.3.2.6 Acceptance Criteria. Must meet VTS requirements.

- The Rear Defog and Defrost Feature shall become active when remote started and the Ambient Air temperature is < 5 °C.
- There shall be a voltage reading in the Grid in an active state.
- The Rear Defog and Defrost Feature shall not activate and but will be in an enabled state on a remote start if the Ambient Air temperature is > 5 °C.
- There shall be NO voltage reading in the Grid in an enabled state.

4.3.3 Automatic Transition from Enabled State to Active State when Outside Ambient Air < 5 °C.

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4.3.3.1 Purpose.

- To verify that when Rear Defog and Defrost set at AUTO and the Outside Ambient Air < 5 °C (Cal value), Rear Defog and Defrost shall be activated upon Power Mode Ignition ON.
- To verify that there is no unintended deactivation or activation.

4.3.3.2 Equipment. See section 3.2.

4.3.3.3 Conditions. See section 4.2.

4.3.3.4 Preparation. See section 4.1.

4.3.3.5 Procedure.

4.3.3.5.1 Configure the Rear Defog and Defrost Feature at the display screen to Defog and Defrost MANUAL/AUTO and select AUTO if not already done so.

4.3.3.5.2 Raise the Trunk Lid/Lift Gate if needed to get access to the positive and negative (ground) terminals of the Backlight thermal grid.

4.3.3.5.3 Locate the positive and ground/negative terminals of the grid.

4.3.3.5.4 Close the Trunk Lid/Lift Gate before running the test.

4.3.3.5.5 With the AUTO Selection, the Defog and Defrost shall be enabled and ready for command until the setting is changed.

4.3.3.5.6 Ambient Air temperature is < 5 °C.

4.3.3.5.7 Power Mode Ignition ON.

Note: Rear Defog and Defrost Feature shall be AUTOMATICALLY activated.

4.3.3.5.8 To verify active state, check for the voltage in the grids with the multimeter and record the response Data Sheet A1, Appendix A for Section 4.3.3.

4.3.3.5.9 Alternate Case. When ambient is > 5 °C.

4.3.3.5.10 Repeat the test as above in Ignition Mode ON at the ambient > 5 °C and record the response in Data Sheet A1, Appendix A for Section 4.3.2.

4.3.3.6 Acceptance Criteria. Must meet VTS requirements.

- The Rear Defog and Defrost Feature when set at AUTO, shall transition to active state automatically if the Power Mode Ignition is ON and the Ambient Air temperature is < 5 °C.
- There shall be a voltage reading in the Grid when Rear Defog Defrost transitions to active state.
The Rear Defog and Defrost Feature shall not activate automatically on a Power Mode Ignition ON if the ambient temperature is > 5 °C.
- There shall be NO voltage reading in the Grid if the Rear Defog is not active or is enabled state.

4.3.4 Transition between States.**4.3.4.1 Purpose**

- To verify that Rear Defog and Defrost Feature shall transition from enabled state to inactive state when Power Modes is OFF.
- To verify that the Rear Defog and Defrost Feature shall transition from active state to enabled state when Rear Defog and Defrost switch is turned OFF (Power Mode Ignition ON).
- To verify that defog and defrost Feature shall transition from active state to inactive state when Power Modes Ignition is OFF.
- To verify that there is no unintended activation or deactivation.

4.3.4.2 Equipment. See section 3.2.

4.3.4.3 Conditions. See section 4.2.

4.3.4.4 Preparation. See section 4.1.

4.3.4.5 Procedure.

4.3.4.5.1 Raise the Trunk Lid, Lift Gate if needed to get access to the positive and negative (ground) terminals of the Backlight thermal grid.

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