GM WORLDWIDE ENGINEERING STANDARDS	Test Procedure	GMW16780

Aero Shutter Assembly Cycle Durability 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 determine if an aero shutter assembly meets the cycle durability requirements of the Component Technical Specification (CTS).

1.2 Applicability. For all aero shutter assemblies.

1.3 Remarks. Not applicable.

2 References

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

2.1 External Standards/Specifications.

ISO 12103-1

2.2 GM Standards/Specifications.

GMW3221

2.3 Additional References.

Component Technical Specification

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.

3.1.3 Environmental Chambers. Environmental chambers capable of maintaining temperatures from -10 °C to +120 °C and large enough to test multiple aero shutter assemblies at one time.

3.2 Equipment.

3.2.1 Software. Software and interfacing hardware shall be provided by the actuator supplier that includes the operating parameters for the actuator and can be used with a personal computer.

3.2.2 Pulse Width Modulation (PWM) or Local Interconnect Network (LIN) Generator. PWM and/or LIN generators are required to allow the software to send a signal to the actuator to cycle the aero shutter assembly and send a signal back through the software that the aero shutter assembly was able to successfully cycle. The test engineer needs to verify the correct generator to use on each program with the responsible designing engineer.

3.2.3 Battery Source – 12 V. A 12 V battery source is required to power the actuator.

3.2.4 Temperature Measurement. A contactless infrared pyrometer is required to measure surface temperature.

3.2.5 Coordinate Measuring Machine (CMM). A CMM is required to verify the design operating angle of the aero shutter assembly.

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3.2.6 Camera. A camera is required for pre and post test photographs.

3.3 Test Vehicle/Test Piece.

3.3.1 Test Piece. The parts used for Design Validation (DV) testing shall be complete aero shutter assemblies off of prototype tools. The parts used for Product Validation (PV) shall be complete aero shutter assemblies off of production tools.

3.3.2 Test Piece Quantity. Per CTS.

3.3.3 Conditioning. Conditioning to GMW3221, Code A.

3.4 Test Time. For one life:

Calendar time:	60 days
Test hours:	1440 hours
Coordination hours:	8 hours

3.5 Test Required Information.

3.5.1 Aero Shutter Assembly Design Operating Angle. A CMM is to be used to measure the location of the end stops on the aero shutter assemblies prior to test. Based on these measurements calculate the design operating angle and document in Data Sheet A1.

3.5.2 Test Setup Photographs. Take photographs of the test setup prior to start of test.

3.5.3 Part Photographs. Take photographs of the part to be tested prior to start of test, in the event of a failure, and at end of test.

3.6 Personnel/Skills. Prior experience in setting up and running similar tests and experience in the use of the referenced test equipment are critical to achieving the estimated times in 3.5.

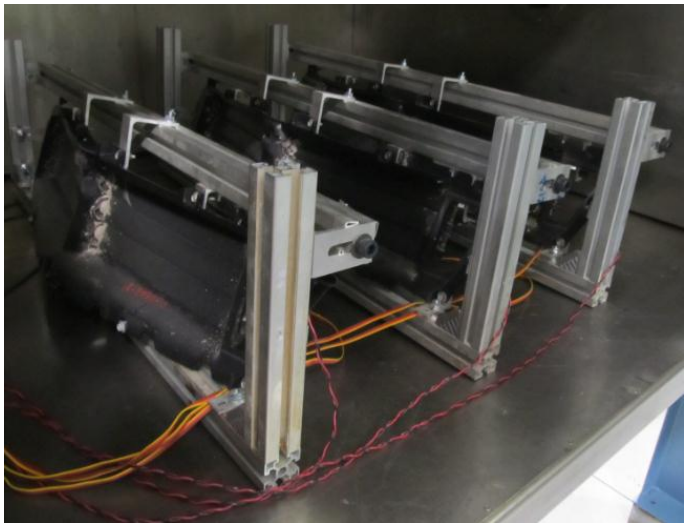
4 Procedure

4.1 Preparation. Not applicable.

4.2 Conditions.

4.2.1 Test Piece Constraints. The aero shutter assembly is to be securely constrained to a test fixture representing all vehicle attachments and positioned in vehicle orientation. An example is provided in Figure 1.

Figure 1: Example of Test Setup



4.2.1 Environmental Conditions.

4.2.1.1 Temperatures. Test shall be run at ambient, humid, hot, and cold temperatures per the CTS.

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