



Extended Stall Test for Assessment of Gear Jams

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. This specification assesses the robustness of regulator motor gear system against stall loads at high temperatures by simulating creep effects on motor gear drive.

1.2 Applicability. This procedure applies to all cable-drive regulator systems.

1.3 Remarks. This specification is a comparison test for regulator systems. The voltage and line resistances do not necessarily represent the vehicle electrical architecture.

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

3 Resources

3.1 Facilities. The testing may be performed in any recognized structural/body test lab as long as the following conditions are observed:

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. Testing should be performed using a test fixture. The mounting locations should be identical as that used in a real vehicle. See Appendix A, Figure A1.

3.3 Test Vehicle/Test Piece. Testing must be performed on a new set of regulators and motors.

3.4 Test Time.

Calendar time: 8 d
Test hours: 96 h test + 96 h soak
Coordination hours: 16 h (range 2 h/d)

3.5 Test Required Information. Not applicable.

3.6 Personnel/Skills. Not applicable.

4 Procedure

After the regulator has been forced into its full up stall position by the motor stall force, on a test fixture, it must be able to reverse from its full up stalled position with 8.5 V DC or less at the motor terminal (MT).

4.1 Preparation. Ensure that the window regulator is mounted in the same manner as in the actual vehicle.

The load cells need to be calibrated before beginning the test.

4.2 Conditions. Use hard up stall unless otherwise specified (not soft up-stop).

4.2.1 Environmental Conditions. All testing and soak shall be performed at hot $85\text{ }^{\circ}\text{C} \pm 2\text{ }^{\circ}\text{C}$ unless otherwise specified.

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 Break in the regulator by performing the following initial cycles:

4.3.1.1 Cycle the window regulator 100 full up/down cycles using durability cycling conditions.

4.3.1.2 Use a stall time of 1 s for up stall and down stall.

4.3.1.3 Let the motor cool to room temperature.

4.3.2 Reverse Voltage Test. Apply 6 V DC at motor, in the down direction and raise the voltage in increments of 0.5 V until window regulator lowers (must reverse within 8.5 V DC or less at motor).

4.3.3 Long cycle Test.

4.3.3.1 Cycle the motor for 60 long cycles with 14.0 V at motor. The stall time in the up stall is 12 minutes for each cycle. Stall time at down stall is 1 s. Do not allow any reversal as a result of back drive by shorting motor terminals.

4.3.3.2 At the end of the final cycle, stop at up stall. Do not allow any reversal as a result of back drive by shorting motor terminals.

4.3.4 Soak for 12 h at up stall.

4.3.5 Apply 6 V DC at motor, in the down direction and raise the voltage by 0.5 V increments (must reverse with 8.5 V DC or less) until window regulator lowers.

4.3.6 Repeat 4.3.3, 4.3.4, and 4.3.5 until failure (motor does not reverse at 8.5 V or less at motor terminals) or for a maximum of 480 cycles.

Following the above test, the window regulator must operate without objectionable noise or bind conditions and must meet performance requirements.

5 Data

5.1 Calculations. Collect data for stall forces at up stall, current and voltage traces.

5.2 Interpretation of Results. Plot of reverse voltage as a function of number of long cycles (Appendix A, Figure A2).

The current and voltage traces in the form of a HIOKI plot must be presented. Refer Appendix A, Figure A3.

A plot of stall force vs voltage must be presented for voltages of 12.5 V at motor to 16.0 V at motor. See Appendix A, Figure A4.

5.3 Test Documentation. Not applicable.

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.

Attachment Bar/Simulated Weight: A bar of metal that simulates the weight of the glass.

Glass Guidance System: A hardware subsystem of side-door, end-gate, or mid-gate which controls the movement of window glass.