



Window Regulator Efficiency

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 determine the window regulator efficiency.

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

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 regulator supplier is responsible for this test, which should be performed at supplier's 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.

3.2.1 Window regulator mounting fixture used for regulator durability testing.

3.2.2 Torque wrench with a capacity of approximately 1.5 times the required torque specifications.

3.3 Test Vehicle/Test Piece. Prototype regulator which meets design intent.

3.4 Test Time.

Calendar time: 1 d

Test hours: 1 h

Coordination hours: 2 h

3.5 Test Required Information. Not applicable.

3.6 Personnel/Skills. Not applicable.

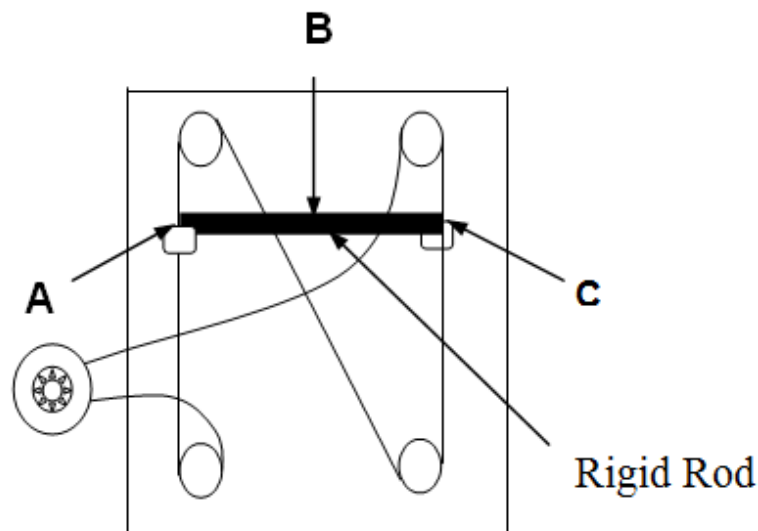
4 Procedure

4.1 Preparation. Remove motor from window regulator to expose the gear inside the cable drum.

4.2 Conditions.

4.2.1 Environmental Conditions. Test to be done at ambient at normal humidity.

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.



Note: Loading Positions **A**: Near Front Carrier, **B**: Middle between Front and Rear Carriers and **C**: Near Rear Carrier.

Figure 1: Regulator Diagram with Points A, B, and C Noted

4.3 Instructions. Reference Figure 1.

4.3.1. Mount the regulator in a fixed rigid fixture.

4.3.2 Measure the length of AC. B is the middle point of AC.

4.3.3 Place various weights at position A (W).

4.3.4 Use a torque wrench to move the weight up and record the required Torque (T).

4.3.5 Repeat Steps 4.3.3 and 4.3.4 with load placed in position B.

4.3.6 Repeat Steps 4.3.3 and 4.3.4 with load placed in position C.

4.3.7 Measure the drum radius (r).

4.3.8 Use the equation in 5.1 to estimate regulator efficiency (η) for load with various magnitudes and at various locations.

5 Data

5.1 Calculations. The window regulator efficiency is estimated as:

$$\eta = \frac{W}{T \div r}$$

Where:

η = regulator efficiency

W = weight

T = torque

r = radius

5.2 Interpretation of Results. Not applicable.

5.3 Test Documentation. Appendix A Data Sheet A1 Calculation Results including the load, glass attachment location, and regulator efficiency shall be reported to the responsible GM Product Engineer and Validation Engineer.