



Window Regulator Freeze

1 Scope

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 a window regulator's performance when it is subjected to various wet conditions at freezing temperatures.

1.2 Foreword. A window regulator can have significantly different performance at varying environmental conditions. Because of the potential for water exposure and, therefore, a freeze condition in the door, this freeze performance evaluation is an important tool in fully comprehending the performance of the regulator. This test must be done on both the left and right hand window regulators.

1.3 Applicability. This procedure applies to all vehicles that have power window regulator as part of the door system.

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

2.3 Additional References.

Program Specific Window Regulator Component Technical Specifications (CTS).

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 be used. However, all measuring variables as specified in this standard shall be quantified correctly with respect to their physical definition.

3.1.3 Environmental chamber must be capable of maintaining a constant test temperature of -30 °C.

3.1.4 Environmental chamber must circulate air in a diffused fashion that does not cause a noticeable wind across the regulator, drying out the vehicle prior to the actual freeze event.

3.2 Equipment.

3.2.1 Fixture for holding the window regulator in vehicle position (if not using a door for testing).

3.2.2 Cart (or similar) to hold either the fixture or the door.

3.2.3 Two (2) 60 mL bottles.

3.2.4 Syringe with an Intravenous (IV) catheter tube (or similar).

3.2.5 Appropriate equipment to supply 10.5 V stall voltage to the window regulator. For base power regulators, this should be applied directly to the motor terminals of the window regulator. For power systems with electronics, window movement control occurs via the Local Interconnect Network (LIN) communications in the electronics.

3.3 Test Vehicle/Test Piece. Either a regulator in a fixture or a regulator mounted in a door.

3.4 Test Time.

Calendar time:	1 day
Test hours:	4 hours
Coordination hours:	4 hours

3.5 Test Required Information. Not applicable.

3.6 Personnel/Skills. Prior experience in setting up and running similar tests and experience in the use of the referenced test equipment is critical to the overall quality of the results produced by this test.

4 Procedure

4.1 Preparation.

4.1.1 Sample Preparation - Test Items. Requesting engineer should inspect the test items to ensure that all material listed in 3.3 is of the correct design level and has been assembled properly.

4.1.2 Sample Preparation - Window Regulator. Requesting engineer should ensure that the window regulator is correctly mounted to the fixture or the door.

4.2 Conditions.

4.2.1 Environmental Conditions. All testing takes place at -30 °C.

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 Setup Instructions.

4.3.1.1 Place the door or fixture (with regulator attached) to a cart (or similar) and ensure that the regulator is in the car position. If using a fixture, the fixture should be level both fore/aft and cross-car.

4.3.1.2 Ensure the ability to provide 10.5 V stall voltage to the window regulator. For base power regulators, this should be applied directly to the motor terminals of the window regulator. For power systems with electronics, window movement control occurs via the Local Interconnect Network (LIN) communications in the electronics.

4.3.1.3 Ensure the regulator is in the full-up stall position.

4.3.2 Test Operation Instructions. All at -30 °C.

4.3.2.1 Place the cart (with fixture or door attached) in the chamber at -30 °C and allow it to soak for 15 minutes.

4.3.2.2 Keep the regulator in the -30 °C chamber and apply one 60 mL bottle of water from ambient temperature to each side of the cable drum (targeting the cable and cable grooves) at 1 mL/s (or 1 minute to empty the 60 mL bottle). See Appendix A, Figure A1.

4.3.2.3 Allow the water to freeze for 15 minutes.

4.3.2.4 Use a syringe with an Intravenous (IV) catheter (or similar) to apply 5 mL of water to the cable drum. When applying the water, make sure to create ice in the entire empty groove of the cable drum. See Appendix A, Figure A2. Water may need to be applied multiple times to create the amount of ice as seen in Appendix A, Figure A2. Typically, four (4) applications are sufficient. The most effective way to achieve this is by applying small drops of water with the syringe, allowing them to freeze and building off each drop.

4.3.2.5 Allow the regulator to soak and the water to freeze for 30 minutes in the -30 °C chamber.