



Evaluation of ETR Functionality with Cinching Latches

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 test procedure is to verify countermeasures to prevent entrapment of occupants in an enclosed trunk compartment when a power self-closing (i.e., cinching) latch is used. Evaluation of the Emergency Trunk Release (ETR) functionality when:

- ETR and touch pad are activated repeatedly or simultaneously during cinching operation and ETR or touch pad is activated when latch is not neutralized.

1.2 Applicability. Vehicles with power trunk mechanisms or vehicles with power cinching latches applied to an enclosed cargo space at least large enough to fit a three (3) year old child test dummy as defined by the requirements FMVSS 401. Applies to all vehicles that have an ETR and a cinching latch on the same closure.

1.3 Remarks. None.

2 References

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

2.1 External Standards/Specifications.

FMVSS 401

2.2 GM Standards/Specifications.

None

2.3 Additional References. None.

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.

3.2.1 Power supply.

3.2.2 Test box for Body Control Module (BCM) simulation.

3.2.3 Hand held force gauge.

3.2.4 Laptop with serial data hardware and software, example, Neovi and CANape tool to connect to vehicle or test buck.

3.3 Test Vehicle/Test Piece. Body in white with closure, hinges, latches, seals, striker, wire harness, power control module, touch pad, ETR.

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3.4 Test Time.

Calendar time: 2 d

Test time: 8 h

Coordination time: 4 h

3.5 Test Required Information. Provide test results on the ability of the latch system to successfully function during the test conditions.

3.6 Personnel/Skills. Prior experience in setting up and running similar tests and experience in the use of the referenced test equipment (CANape, Neovi interface) is crucial to the overall quality of results produced by this test. An individual performing this test for the first time should have an experienced mentor working with them. Consultation with the latch Design Release Engineer (DRE), Build of Materials (BOM) Family Owner (BFO) or Closures Software Architect may be necessary when first evaluating a new latch system.

4 Procedure

4.1 Preparation.

Rig the ETR. Use a tether or string so that the ETR can be pulled from outside of the vehicle. Make sure that the tether pull direction is in line with the nominal ETR pull direction (reference Figure A1 for a typical power decklid system layout). Ensure that the ETR handle is fully seated into its bezel after attachment of the tether and prior to the start of each test.

4.1.1 Splice into latch harness Splice into the power or ground line of the latch so that power can be interrupted. Install a wire jumper with a toggle switch in line to allow disconnection of power to the cinching motor.

4.1.2 Identify type latch being used. The test requestor must identify the type of cinching latch being used. The two (2) types are: latches with a manual cinch interrupt or latches without a manual interrupt.

4.1.3 Panel fits. Adjust panel gaps and flushness for proper fits, requirements should be provided by the test requestor.

4.2 Conditions.

4.2.1 Environmental Conditions. All tests to be done at room temperature, unless otherwise requested. Perform all testing at room temperature.

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.

All tests will start with the closure open and vehicle unlocked. The panel will then be slowly manually closed to the secondary latched position or just to the point where the latch begins to cinch. Verify that the latch cinches and neutralizes normally from manual closure to the point where the latch starts cinching. Verify it releases normally from the touch pad after neutralization.

Allow latch to cinch and neutralize, then verify ETR function and record release effort with a force gauge. During the cinching operation and neutralization operation, interrupt operation per the 8 test combinations specified in Appendix A, Table A1. Unless otherwise noted, the expected result is that the panel opens, record result in the report.

After each test reseal the ETR handle if necessary and manually latch to the secondary position and confirm that the latch still cinches normally, record observations. Electrically release latch in preparation for the next test. Note in the report if the latch does not release.

4.3.1 Instructions for testing latches stopped between cinching and neutral. The next series of tests require that the power to the latch be interrupted between cinching and neutralization.

Begin by manually closing the panel to the secondary latched position or just to the point where the latch begins to cinch. Use the Neovi tool to identify when cinching is completed.

After the latch has cinched, but before it completes neutralization, use your power interrupt switch to disconnect power to the cinch motor. Interrupt neutralization as soon as possible after completion of cinching.

4.3.1.1 Latches with a manual interrupt.

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- Release latch with the ETR using a force gauge to measure the effort.
- Record results in the report.
- Reset the ETR.
- Restore power to the latch and verify that the latch neutralizes by checking the neutral switch status via the Neovi tool.
- Record observations in the Appendix B, Data Sheet B1.

4.3.1.2 Latches without a manual interrupt.

- Using the power interrupt switch restore power to the latch after leaving it disconnected for a minimum for 5 s.
- Verify that the latch neutralizes by checking neutral switch status via the Neovi tool.
- Record observations in the Appendix B, Data Sheet B1.

4.3.2 Test of interrupted latch gone into sleep mode. Begin by manually closing the panel to the secondary latched position or just to the point where the latch begins to cinch. Use the Neovi tool to identify when cinching is completed. After the latch has cinched, but before it completes neutralization, use your power interrupt switch to disconnect power to the cinch motor. Interrupt neutralization as soon as possible after completion of cinching. Use the power interrupt switch to restore power to the latch after leaving it disconnected for a sufficient amount of time to ensure control module has gone into sleep mode (confirm the amount of time for inactive sleep mode with the module engineer). Restore power to the latch. Perform each of the operations shown in Appendix A, Table A2 while module and latch are in this state and record results. Latch should neutralize upon ETR or touchpad input and latch should release after completion of each of these operations.

4.3.3 Test of Blocked cinching. Begin with the panel fully latched and measure the body panel gap nearest the latch. Fix a scale on the body to measure the gap. Open, then manually close the panel to the secondary latched position or just to the point where the latch begins to cinch and determine the approximate cinching distance using the scale. Next, use or fabricate a plastic or metal block whose thickness is approximately $\frac{1}{2}$ of the distance between the start of cinching and the fully closed panel gap measurements.

Using the Neovi tool, or a current clamp and oscilloscope, measure the current supplied to the latch motor during a normal cinch closed operation and record the cinch operation time and peak value. Record Neovi traces if Neovi equipment is used.

Fix the block to the vehicle body or closure as close to the latch as possible. Manually engage the latch to the striker at the start of cinching position and record results using Neovi or oscilloscope measurements. Note if the latch successfully cinches then it may be due to deflection between the body, the closure panel and the block. Increase the thickness and/or width of the block until it successfully prevents the latch from reaching full cinch operation and record the resulting peak current or Neovi traces of the event. If the latch does not fully release from an aborted cinch, manually release the latch by the ETR using a force gauge to record the peak effort to release the latch from this condition. Check the fuse to the latch control module power supply for proper resistance after this test.

The expected result is that when cinching is prevented by an interference condition or high reactive load, the cinch latch operation should abort prior to exceeding the current carrying capacity of the fuse and the latch should successfully neutralize and either go to full release, or to a position such that the ETR can release the latch with at most 30 N of force.

5 Data

5.1 Calculations. Not applicable.

5.2 Interpretation of Results.

Unless otherwise noted in 4.3, the following occurrences would be considered test failures and should result in the issuance of a Problem Resolution Tracking System (PRTS) for documentation and resolution:

- a. Inability to release the latch by ETR following a test.
- b. Latch fails to neutralize following a test.
- c. Effort to release by manual ETR exceeds 30N following a test.
- d. Latch fails to cinch or power release normally following a test.

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