



## **Retractor – Door-Mounted Passive "High G" Lock-Up**

### **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 "High G" block-out and lock-up characteristics of a door-mounted vehicle sensitive retractor.

**1.2 Applicability.** All door mounted passive restraint safety belt retractor assemblies with an electromechanical block-out mechanism.

**1.3 Remarks.** The intent of this procedure is to determine the maximum acceleration (G level) in which an activated block-out mechanism will prevent the retractor from locking-up. This also is intended to evaluate the minimum acceleration (G level) in which the retractor lock-up mechanism will override the activated block-out mechanism. The purpose of this procedure is primarily for development, validation and qualification tests. The production audit test method may be altered based on an agreement with engineering, quality assurance and the supplier.

### **2 References**

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

#### **2.1 External Standards/Specifications.**

None

#### **2.2 GM Standards/Specifications.**

GMW14831

#### **2.3 Additional References.**

- American National Standard for Calibration, Calibration Laboratories and Measuring and Test Equipment – General Requirements
- GM Math File Log

### **3 Resources**

**3.1 Facilities.** General Motors certified test lab.

**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.** The equipment per 3.2.1 thru 3.2.5 or equivalent is required.

**3.2.1 Retractor** to be tested.

**3.2.2 Acceleration sled,** servo controlled and capable of reaching the desired acceleration level in less than 25 ms. Overshoot must not exceed 10% of the test value. Acceleration must remain constant for a minimum of 40 ms.

**3.2.3 Light beam recorder** or oscilloscope.

**3.2.4 Power supply** (i.e., 5 A minimum) with adjustable voltage.

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**3.2.5** Mounting fixture to mount retractor in body position.

**Note:** All equipment must be calibrated in accordance with American National Standard for Calibration, Calibration Laboratories and Measuring and Test Equipment – General Requirements.

**3.3 Test Vehicle/Test Piece.** Not applicable.

**3.4 Test Time.** Time for setup and test as required.

**3.5 Test Required Information.** Record test data.

**3.6 Personnel/Skills.** Test technician/test engineer.

## 4 Procedure

### 4.1 Preparation.

**4.1.1** Mount the appropriate mounting fixture to the sled such that the retractor can be mounted in body position and excited in the "inboard direction".

**4.1.2** Disconnect or disengage the comfort mechanism for the duration of tests to be performed.

**4.1.3** Extract enough webbing off the spool so that it is representative of the amount of webbing on the spool with the door open and attach the webbing end to the fixture clip or hook.

**4.1.4** Energize the block-out mechanism at 12 V (unless otherwise specified) just prior to each test trial and de-energize the block-out mechanism after each test trial to prevent heat buildup in the block-out mechanism. A fan may be used to cool the solenoid.

**4.2 Conditions.** See GMW14831.

**4.2.1 Environmental Conditions.** Not applicable.

**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. Deviations from the requirements of this standard shall be approved by GM engineering and documented in the GM Math File Log.

### 4.3 Instructions.

#### 4.3.1 Effectiveness of the Block-Out Mechanism.

**Note:** The effectiveness of the block-out mechanism is considered to be the maximum acceleration level in which ten consecutive no-lock conditions are observed.

**4.3.1.1** Accelerate the retractor at the minimum acceleration level in which the block-out mechanism is specified to be effective. Check for a no-lock condition.

**4.3.1.2** If a no-lock condition is observed, conduct lock tooth scanning, move the starting position of the sled forward 2 mm and repeat the test at the same acceleration level. Repeat this sequence for a total of ten measurements or until a lock-up occurs. A lock-up indicates that the block-out mechanism is not effective at this acceleration level and testing should be discontinued.

**4.3.1.3** If after ten consecutive tests a lock-up condition is not observed, increase the acceleration level by 0.5G and return the sled to the start position. Repeat the test sequence outlined in 4.3.1.1 thru 4.3.1.2.

#### 4.3.2 Override of the Block-Out Mechanism.

**Note:** The effectiveness of the override mechanism is considered to be the minimum acceleration level in which ten consecutive lock conditions are observed.

**4.3.2.1** Increase the acceleration level per 4.3.1.3 by 0.5G. (It is permissible to start sampling at a higher acceleration level as long as the minimum acceleration level that produces ten consecutive lock-up is identified.)

**4.3.2.2** Accelerate the retractor and check for a lock-up condition.

**4.3.2.3** If a no-lock condition occurs, increase the acceleration rate by 0.5G and repeat the test sequence. Repeat this procedure of scanning at 2 mm increments and increasing the acceleration level by 0.5G until ten consecutive lock-ups occur at an acceleration level.

## 5 Data

**5.1 Calculations.** Not applicable.

**5.2 Interpretation of Results.** Not applicable.

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