GM WORLDWIDE ENGINEERING STANDARDS	Test Procedure	GMW14301

Retractor – Extraction and Retraction Efforts

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 extraction and retraction efforts of a safety belt assembly including the retractor and guide loop as maintained in body position or other specified position.

1.2 Applicability. To all safety belt assemblies with retractors.

1.3 Remarks. This procedure is intended to evaluate in the laboratory the extraction and retraction forces as related to occupant usage in a vehicle for all types of safety belt systems. Refer to GMW14793, Belt Assembly – In Vehicle Evaluation, to measure the retractor efforts and chest pressure in the vehicle.

2 References

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

2.1 External Standards/Specifications.

None

2.2 GM Standards/Specifications.

GMW14793 GMW14831

2.3 Additional References.

- American National Standard for Calibration, Calibration Laboratories and Measuring and Test Equipment – General Requirements
- GM Master Three Dimensional (3D) Math File
- GM Math File Log
- Safety Belt Assembly Drawing

3 Resources

3.1 Facilities. GM 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 following equipment or equivalent is required.

3.2.1 Safety belt assemblies to be tested.

3.2.2 Corresponding Safety Belt Assembly Drawing when available.

3.2.3 Fixture to hold the safety belt assembly in specified position as defined by GM Master Three Dimensional (3D) Math File.

3.2.4 Load cell suitable to measure retractor efforts (i.e., 20 N capacity) mounted on a linear testing fixture with a minimum travel length of 1800 mm and a smooth travel rate of 25 mm/s ± 10%.

3.2.5 Hook or equivalent means to attach the load cell to the webbing.

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3.2.6 Suitable linear transducer (0 mm to 1800 mm capacity minimum).

3.2.7 X to Y recorder and appropriate amplifier.

3.2.8 Graph paper prepared as shown in Appendix A, Figure A1.

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. As applicable safety belt assembly, buckles and guide loops.

3.4 Test Time. Determined as needed.

3.5 Test Required Information. Record force versus displacement plot.

3.6 Personnel/Skills. Test technician or test engineer.

4 Procedure

4.1 Preparation. See GMW14831.

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.

Note: For dual loop belt assemblies, the retraction and extraction efforts for each retractor (or spool) are measured separately.

4.3.1 Prepare a sheet of graph paper similar to the sample shown in Figure A1. (Refer to GMW14831, "Retractor Efforts for Comfort" or the Safety Belt Assembly Drawing for the extraction/retraction effort specifications and for the dimension for full stow of webbing by design.)

4.3.1.1 Mark the retractor webbing or use the appropriate stops on the fixture to indicate full extraction and stowage of webbing.

4.3.1.2 Mount the retractor and guide loop (if applicable) on the fixture such that the belt assembly is held in the specified position as defined by GM Master 3D Math File. For dual retractor (or spool) systems, either separate the retractors by cutting the webbing at the junction or extract all of the webbing from the retractor not being tested and clamp the webbing such that only the efforts from the "test" retractor are being measured.

4.3.1.3 Adjust the track of the linear test fixture to the specified pull angles. Forty-five (45) degrees inboard/45 degrees forward. Stow the full length of webbing on the spool as marked in 4.3.1.1.

4.3.1.4 Calibrate and zero the X to Y recorder for the load and displacement scales used on the graph paper.

4.3.1.5 Attach the webbing to the load cell and allow the specified webbing length to retract onto the spool to its full stowage by design. (It is permissible to start the evaluation from full extraction by design.)

4.3.1.6 Deactivate (if applicable) the comfort mechanism lever/plunger to simulate the door open position.

4.3.1.7 With the linear test fixture, extend the webbing completely from the spool and then reverse the travel of test fixture to allow webbing to retract to full stowage. During this cycle plot the extraction/retraction force versus displacement for the complete cycle (if applicable, label whether the comfort mechanism is "off" or "on".) Extract and retract the webbing at 25 mm/s ± 5 mm/s.

4.3.1.8 Activate (if applicable) the comfort mechanism and repeat 4.3.1.5 thru 4.3.1.7.

4.3.1.9 Repeat 4.3.1 thru 4.3.1.8 to test additional retractor(s) or spool(s).

5 Data

5.1 Calculations. Not applicable.

5.2 Interpretation of Results. Not applicable.

5.3 Test Documentation. Record force versus displacement plot (see Appendix A, Figure A1).

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