



Shoulder Belt Comfort Evaluation Part A: Belt Tension Measuring Procedure

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 standard is to evaluate the force level exerted by the shoulder belt on an occupant's torso. This force is experienced by the occupant as a pressure that may result in discomfort.

1.2 Applicability. This standard is applicable to all safety belt systems with a retracting shoulder belt.

1.3 Remarks. This procedure is intended for the evaluation of safety belt systems relative to the shoulder belt tension guidelines established for early vehicle development. See GMW14790 and GMW14791 for "Part B" which covers belt routing.

2 References

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

2.1 External Standards/Specifications.

None

2.2 GM Standards/Specifications.

GMW14790

GMW14791

3 Resources

3.1 Facilities. Any location that is capable of accommodating a vehicle or test buck at room temperature with ambient lighting suitable for the operation of the test equipment.

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 test equipment or equivalent is required.

3.2.1 Test manikin (or equivalent) as shown in Appendix A, Figure A1.

3.2.2 Instrumentation (or equivalent) as shown in Appendix A, Figure A1.

3.3 Test Vehicle/Test Piece.

3.3.1 The safety belt system to be tested.

3.3.2 The vehicle or test buck with the intended environment for the safety belt system to be evaluated (including seating characteristics, belt anchorage locations, and any components which may affect belt routing or belt tension).

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3.4 Test Time.

Calendar time: 1 day

Test hours: 1 h

Coordination hours: 3 h

3.5 Test Required Information. Not applicable.

3.6 Personnel/Skills. Not applicable.

4 Procedure

4.1 Preparation. With all equipment per 3.2 and stabilized at approximately room temperature, assemble the test manikin (3.2.1) and the instrumentation (3.2.2) as shown in Appendix A, Figure A1 and proceed as follows.

4.1.1 Calibrate the X-Y plotter to obtain the following scaling.

4.1.1.1 Force Measurement: "Y" axis, 10 N calibration value, 2 N per major scale division.

4.1.1.2 Displacement Measurement: "X" axis, 10 degrees = 80 mm calibration value, 20 mm per major scale division.

4.1.2 Select the vehicle seating position to be evaluated and proceed as follows.

4.1.2.1 If adjustable, position the seat in mid and full down (or as desired), and the seat back in the approximate design location. If the seat back incorporates contour adjustments, place all segments in the compressed position.

4.1.2.2 Place test manikin on seat with the back of its upper torso flush against the seat back cushion.

4.1.2.3 Center the test manikin laterally on the seat position selected or between the lap belts at that position (whichever is more appropriate).

4.1.2.4 Starting with the "adjustable seat pan", (see Appendix A, Figure A1) in the closed position and maintaining the back of the upper torso flush against the seat back cushion, extend the rear edge of the "adjustable seat pan" rearward until contact is made with the seat back cushion. Secure the "adjustable seat pan" in this position with the clamp provided.

4.1.3 Attach the safety belts around the manikin and cinch the lap belt until the "adjustable seat pan" is held on the seat (do not compress the "adjustable seat pan" into the seat).

4.1.3.1 If the safety belt system incorporates a dropping latch plate, clamp the shoulder belt to the latch plate to prevent webbing transfer (a large paper binder clip is adequate). Use care to avoid the introduction of additional belt slack.

4.1.3.2 If applicable, place the adjustable upper guide loop in mid position (or as desired).

4.1.4 Rotate the upper torso forward and back (20 to 30) degrees. Repeat three times to center the belts.

4.1.5 Place the belt force transducer under the shoulder belt in the slot provided at the "sternum area" shown in Appendix A, Figure A1. Measure the upper torso angle as follows.

4.1.5.1 Assure that the back of the torso is flush against the seat back cushion. If it is not or if any part of the test manikin has moved relative to the initial positioning, reposition the test manikin beginning with 4.1.2.2 and repeat 4.1.2.3 through 4.1.5 as required.

4.1.5.2 Place the retractor in "retraction" mode of operation by extending the webbing away from the transducer and slowly and gently allowing it to return.

4.1.5.3 Measure the upper torso angle with an inclinometer placed on the torso's anterior surface at the medium plane below the "sternum area".

4.1.5.4 If the seat back is adjustable, position the seat back to produce an upper torso angle of 25 degrees rearward from vertical (or as desired). Repeat 4.1.5.2 before measuring.

4.1.6 Mechanically adjust the rotary potentiometer (located at the test manikin hinge point) to a near zero position as follows.

4.1.6.1 Carefully loosen the thumb screw at the rotary potentiometer and rotate the coupling until the signal conditioning unit reads: (0 ± 1) degree.

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