



Lumbar and Lumbar Support Testing

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. Function, wear and durability test of the adjuster of the lumbar support.

1.2 Applicability. Applicable to types:

Type A: Lumbar support with two steel support wires.

Type B: Lumbar support with plastic basket.

1.3 Remarks. Not applicable.

2 References

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

2.1 External Standards/Specifications.

EN 10204

2.2 GM Standards/Specifications.

GMW14709

2.3 Additional References.

CG3909.

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.

3.1.3 Temperature chamber to hold the complete seat temperature range $-30\text{ }^{\circ}\text{C}$ to $+80\text{ }^{\circ}\text{C} \pm 3\text{ }^{\circ}\text{C}$, wall lead through for drive shaft.

3.1.4. Fixture to anchorage a fully trimmed seat back horizontally.

3.2 Equipment. The test facilities and equipment shall be in good working order and shall have a valid calibration label.

3.2.1 Pneumatic or electric control motor nominal torque 5 Nm to 10 Nm.

3.2.2 Torque-measuring hub including signal amplifier, nominal measuring range 10 Nm resolution $< 0.05\text{ Nm}$.

3.2.3 Y-t-Plotter.

3.2.4 Control unit with timer or angular sensor.

3.2.5 Cycle counter.

3.2.6 Coupling pieces for connecting the drive shaft, torque-measuring hub and hand wheel of the lumbar support adjustment.

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3.2.7 Only for measuring Type A Dimensional measuring equipment, e.g., calliper gauge up to 150 mm accurate to 0.1 mm.

3.2.8 Pneumatic cylinder test device, able of pulsating 0 N to 250 N with a frequency of at least 1.5 Hz.

3.2.9 SAE International (SAE) back shell and the coupling parts to the pneumatic cylinder (cardan joint).

3.2.10 Force gauge 2 kN, accuracy $\leq 1\%$ of relevant measured value.

3.3 Test Vehicle/Test Piece. Complete seat with adjuster lumbar support.

3.3.1 The test pieces shall be unambiguously marked before testing and given a serial number.

3.3.2 For initial sampling and approval testing as per these specifications, the lumbar support adjusters shall be supplied from the same production batch with production certification to EN 10204 or equivalent.

3.3.3 The test pieces shall conform to the design characteristics and dimensions specified in the relevant part drawing.

3.4 Test Time. A test time of 13 days is estimated, conducting the soaking in the temperature chamber overnight. For the endurance test, 9 days are estimated.

Calendar time: Not applicable

Test hours: Not applicable

Coordination hours: Not applicable

3.5 Test Required Information. Not applicable.

3.6 Personnel/Skills. Not applicable.

4 Procedure

4.1 Preparation. Types A and B.

4.1.1 The lumbar support adjustment shall be fitted in a completely equipped seat as in production. The padded seat back is not subject to load. The seat shall be placed in the temperature chamber. Using a shaft (fabric hose is possible), one side of the torque-measuring hub shall be connected to one of the hand wheels of the lumbar support. This connection shall be form-fit and free of torsion. The shaft runs through the opening in the temperature chamber. The other side of the torque-measuring hub shall be connected to the drive shaft of the control motor.

4.1.2 Basic illustration of the test assembly see Appendix A, Figure A1 and Figure A2.

4.1.3 For the adjuster durability test, three test pieces of the lumbar support adjuster assembly shall be tested.

4.1.4 For the endurance test 4.3.3, the test shall be performed with four cages.

4.1.5 The endurance test can be performed consecutively after 4.3.2 on the same test piece provided that the preceding test does not affect the characteristic being subsequently tested.

4.2 Conditions.

4.2.1 Environmental Conditions. Environmental testing may be used (Engineering judgment based on materials in agreement with the GM Design Release Engineer (DRE)).

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 Adjuster Durability Type A. This test shall be carried out on both hand wheels of the lumbar support adjustment. The hand wheel not currently being operated shall be set so that the support wire of the seat back is in the rearmost position.

4.3.1.1 Using the control motor, the other hand wheel shall be turned through the entire adjusting range of the lumbar support adjustment (≈ 5 revolutions).

4.3.1.2 Reversal when stop points are reached is achieved by means of detection of the angle of rotation or by a timing mark.

4.3.1.3 Moving the support wire from the rearmost to the foremost position once and back again constitutes one cycle. The number of completed cycles shall be recorded by a counter. After the pre-selected number of cycles

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has been effectuated, the counter switches the control motor off. The adjustment torques shall be measured at the beginning of the test and when certain numbers of cycles are concluded (see test sequence, Appendix B, Table B1). The adjustment torque shall be determined during one complete cycle. The characteristic of the adjustment torque over time shall be recorded by the Y-t-plotter.

4.3.1.4 Test shall comply with Test Sequence, Type A in Appendix B.

4.3.2 Adjuster Durability Type B. At the commencement of the test the dimension X shall be determined. X means the difference between H_{max} (normal distance of point A to wire mat when the basket is in maximum position) and H_{min} (normal distance of point A to wire mat when the basket is in minimum position).

$$X = H_{max} - H_{min}$$

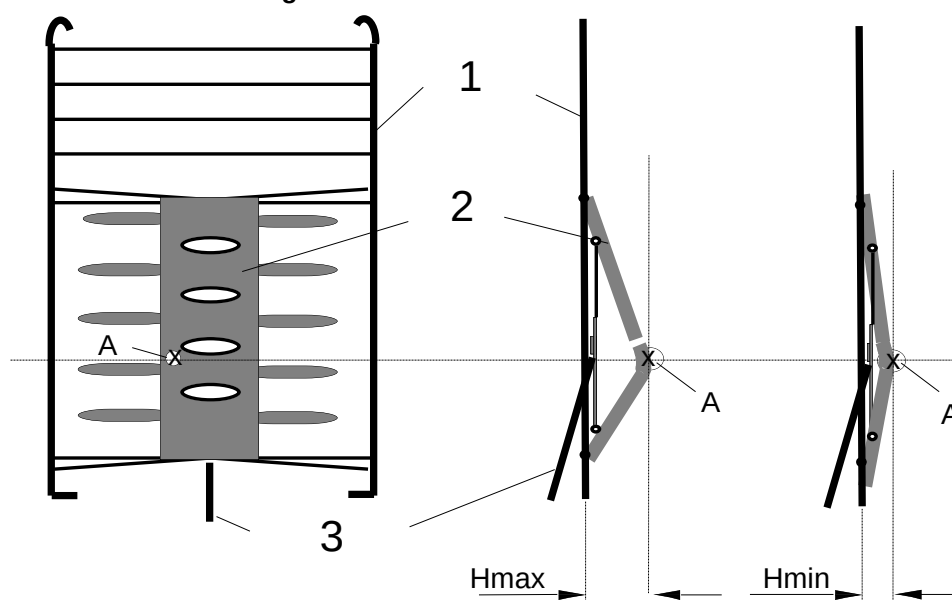
Note: (See Figure 1).

4.3.2.1 After that, the lumbar support is mounted in the seat back. By means of the control motor, the hand wheel shall be turned through the entire adjusting range of the lumbar support adjustment (≈ 4 revolutions). Reversal when stop points are reached is achieved by means of detection of the angle of rotation or by a timing mark.

4.3.2.2 Moving the support wire from the rearmost to the foremost position once and back again constitutes one cycle. The number of completed cycles shall be recorded by a counter. After the pre-selected number of cycles has been effectuated, the counter switches the control motor off. The adjustment torques shall be measured at the beginning of the test and when certain numbers of cycles are concluded (see test sequence). The adjustment torque shall be determined during one complete cycle. The characteristic of the adjustment torque over time shall be recorded by the Y-t-plotter. At the end of the program the lumbar support shall be dismantled from the seat back and the dimensions H_{max} and H_{min} shall be measured.

4.3.2.3 Test shall comply with test sequence, Type B in Appendix C, Table C1.

Figure 1: Dimension X Determination



Key

1 = Wire Mat

2 = Basket

3 = Bowden Cable

4.3.3 Endurance Test. Facilities and equipment according to 3.1.2, 3.2.8, 3.2.9 and 3.2.10.

4.3.3.1 With the lumbar support mounted in fully trimmed seat back, anchor the seat back horizontally.

4.3.3.2 Position the SAE back shell over the lumbar support, according to the testing configuration in the pneumatic testing device. Adjust the lumbar support to the most extended position. (See Appendix C, Figure C1). The SAE back shall be positioned, so that the longitudinal symmetry plane of shell shall be coincident with the

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