



Horn Blowing Mechanism Durability, Steering Wheel

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 evaluate the durability of horn blowing mechanisms which are integral parts of steering wheel assemblies including horn pad(s), cap(s), or airbags, if applicable.

1.2 Applicability. Passenger cars, Multipurpose Passenger Vehicles (MPV), and trucks.

1.3 Remarks. This test is designed to demonstrate durability of the horn blowing mechanism under loading conditions corresponding to extreme usage.

2 References

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

2.1 External Standards/Specifications.

None

2.2 GM Standards/Specifications.

GMW14095

3 Resources

Note: All instrumentation is to be calibrated as required; record instrumentation details and date of calibration on Data Sheet A1 (see Appendix A), unless the information is otherwise preserved in the testing laboratory records.

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 Stroking machine capable of exerting a force up to 130 N at a rate of 1200 cycles/h or less.

3.1.4 Fixture to hold steering wheel/DAB assembly in a horizontal position. The arm of the stroking machine in its travel must depress the horn mechanism in a direction perpendicular ± 20 degrees to its surface.

3.2 Equipment.

3.2.1 Load application device for stroking machine, metal hemispherical in design, 19.0 mm $\pm$ 1.0 mm in diameter.

3.2.2 Electrical system as shown schematically in Appendix A, Figure A1 for steering wheel horn blowing mechanism: a Direct Current (DC) power supply capable of 14 V with ripple not to exceed 5%, and representative vehicle horn system.

3.2.3 A counter (see Appendix A, Figure A1, Counter 2) operated by horn system electrical output signal (not horn switch contacts).

3.2.4 A counter (see Appendix A, Figure A1, Counter 1) operated by a micro-switch which is triggered by the reciprocating motion of the stroking machine ram. This counter is used as a means to compare the horn relay actuation count to the ram actuation count in order to detect horn mechanism malfunction.

3.2.5 A DC current monitoring device which shuts down the system if the amperage gets above 150 mA or below 4 mA (not shown in Appendix A, Figure A1).

3.2.6 A 90 N scale.

3.2.7 Signal buzzer.

3.2.8 Representative Vehicle Horn System: Steering wheel(s) with horn blowing mechanism, coil/related wire harness(es), and airbag, if applicable.

3.3 Test Vehicle/Test Piece. Not applicable.

3.4 Test Time. Test time is typical.

Calendar time: 5 days to 15 days (global DV series)

Test time: 30 h - 40 h

Coordination time: 8 h

3.5 Test Required Information. Not applicable.

3.6 Personnel/Skills. Not applicable.

4 Procedure

4.1 Preparation.

4.1.1 Record parts to be tested.

4.1.2 Mount the steering wheel on the supporting fixture and align so that the load application device on the arm of the stroking machine will operate the horn mechanism at the location that will create the greatest mechanical stress, defined in 4.3.1. The responsible engineer shall denote this location.

4.1.3 Connect the DC electrical system through the coil to the wheel horn blowing mechanism, and set the voltage supply to a nominal $14.0 \text{ V} \pm 0.1 \text{ V}$ DC (open circuit).

4.1.4 Depress the steering wheel horn blowing mechanism manually in several areas to check out the system and to verify that no dead spots exist. Record comments on Data Sheet A2 (see Appendix A).

4.2 Conditions.

4.2.1 Environmental Conditions. Tests shall be conducted at local ambient pressure, relative humidity (RH) $50\% \pm 10\%$, and room temperature $23^\circ\text{C} \pm 3^\circ\text{C}$.

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 Select test location(s) per GMW14095, Horn Blowing Mechanism Durability (Steering Wheel).

4.3.2 Adjust the force of the stroking arm to the greater of the following load values.

- a. A value of $40 \text{ N} \pm 9 \text{ N}$.
- b. Two (2) times the measured maximum room temperature horn blowing load specified in GMW14095.

4.3.3 Set both counters to zero (see Appendix A, Figure A1).

4.3.4 Operate the system at a rate of 1200 cycles/h maximum with an "on time" of 1 s/cycle.

4.3.5 Post Test Verification.

- a. Record the number of cycles shown on counter number two (2) at failure (per 4.3.6) or at 50 000 cycles for all market regions except emerging market region where number of cycles is 250 000 cycles per each of two locations (emerging markets as defined in GMW14095).
- b. Depress the steering wheel horn blowing mechanism manually in several areas to again verify the absence of dead spots and record the results on Data Sheet A2 (see Appendix A).
- c. Inspect for structural integrity/deformation of the mechanism and record condition on Data Sheet A2 (see Appendix A).
- d. At all horn locations, record the effort required to actuate the horn (this can be done by the use of a 90 N scale and a signal buzzer) on Data Sheet A2 (see Appendix A).