



H-Point Measurement: Audit

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. This document provides test methods for evaluating the design H-Point (i.e., Hip Point, also referred to as Seating Reference Point (SgRP)) and Torso Angle measurement. Specifically this standard focuses on setting the seat in design position for the H-Point measurements.

1.2 Applicability. This procedure is to be used on all General Motors seats. This test procedure applies to complete seat systems (production seats or prototypes built at the intended manufacturing quality). Testing must be performed on complete seat backs and complete seat cushions. Tests performed on subsystems or individual components will not be considered valid. For convenience and simplicity, many terms associated with H-Point devices use human body parts in their name. However, they should not be construed as measures that indicate interaction with any or all occupants concerning accommodation, human capabilities, or comfort. H-Point devices do not represent the size or posture of any category of occupant.

1.3 Remarks. The tools and procedures for determining seat coordinate positions used in this document are based on the SAE J826 H-Point Manikin.

2 References

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

2.1 External Standards/Specifications.

SAE J826

2.2 GM Standards/Specifications.

None

2.3 Additional References.

Program Specific Statement of Requirements (SOR) Appendix C1

3 Resources

3.1 Facilities. Tests are to be performed in a climate controlled area capable of maintaining a constant temperature of $23^{\circ}\text{C} \pm 2^{\circ}\text{C}$ and a relative humidity of $50\% \pm 5\%$.

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.

3.2.1 SAE J826 H-Point Manikin (HPM). Body element weight of the HPM is placed at the corresponding centers of gravity to provide seat penetration equivalent to a 75 kg (165 lb) person to the seat. All joints of the HPM machine shall be checked for free movement, noticeable friction shall not appear.

3.2.2 Coordinate Measuring Machine (CMM).

3.2.3 Level.

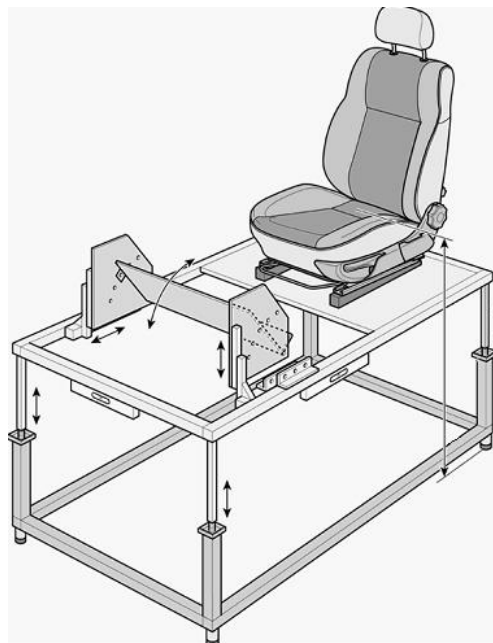
3.2.4 Muslin Cloth.**3.2.5 Ruler/Measuring Stick.****3.2.6 Inclinometer/Angle Measuring Device.**

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

3.3 Test Vehicle/Test Piece. A complete seat, mounted in the vehicle or in a suitable buck that represents proper pedal and seat position characteristics. A suitable buck is the preferred method.

3.3.1 Seat Buck. The measuring buck enables H-Point measurement independent of the vehicle (Figure 1). The measuring buck consists of a rectangular base standing on four feet. In order to level the support horizontally, the feet shall be adjustable in height by screws. Adjustment shall be made by means of a level. The foot rest for the legs of the HPM machine are located at the front of the buck. The foot rest shall be designed to allow vertical and horizontal continuous adjustment to simulate different vehicles. The heels of the HPM machine are supported on a level surface covered with suitable textiles whereas the soles are put on a plate, adjustable in angle.

Figure 1: Example Seat Buck

**3.4 Test Time.**

Calendar time: 0.5 day

Test hours: 2 hours

Coordination hours: 2 hours

3.5 Test Required Information. Provide the vehicle and model of the seat being tested.

3.6 Personnel/Skills. Test requires an engineer or technician capable of running test machinery.

4 Procedure**4.1 Preparation.**

4.1.1 Conditioning. The specimen should be conditioned for at least 4 h before being tested, so as to allow the seat components to reach room temperature, $23\text{ }^{\circ}\text{C} \pm 2\text{ }^{\circ}\text{C}$. Deviations from the requirements of this standard

shall have been agreed upon. Such requirements shall be specified on component drawings, test certificates, reports, etc.

4.1.2 Buck Setup. The buck should be sufficiently mounted or weighed down so as to ensure the buck does not move in any direction during testing. Ensure the buck is level, if it is not level, adjust the mount until level. Adjust the foot rest to match design position. Suitable carpet should be placed where the feet of the manikin will be set. Set the track angle according to design.

4.1.3 Vehicle Setup. The vehicle is to be raised and leveled in such a way that it cannot be moved vertically when weight is added. An example of this is to set blocks or jack stands under points specified by the manufacturer. Once the vehicle is raised, it must be level. This is to be verified with a level, both across the rocker panel and along the length of the vehicle on the rocker panel.

4.1.4 Accelerator Pedal Setup. The accelerator pedal is to be blocked so that it is rigid in the undepressed position.

4.1.5 Seat Conditioning and Recovery. As per SAE J826, if the seat being measured has never been flexed, a person roughly 75 kg shall sit in the seat for two one-minute intervals to compress the cushion and backrest. Before the test, the seat should be allowed to rest for at least 0.5 h without any load.

4.1.6 Muslin Cloth. Before the HPM is loaded in a seat, it is necessary to first cover the entire seating surface of the seat with a muslin cloth so that the HPM does not come in direct contact with the seating surface.

4.2 Conditions.

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.

4.3 Instructions. Complete audit.

5 Data

5.1 Calculations.

5.1.1 Exported Data. The Initial Graphics Exchange Specification (.igs) file with the recorded reference points, planes and lines shall be saved. This file must also include the recorded H-Point, Torso Angle line, Thigh Angle line, Heel Point and Ball of Foot. In addition, the form included in Appendix B (see Form B1) shall be completed and provided to General Motors.

5.1.2 Data Tolerances. The tolerance for H-Point and Torso Angle measurements are outlined in the Program Specific Statement of Requirements (SOR) in Appendix C1.

5.2 Interpretation of Results.

5.2.1 Design H-Point Procedure. The purpose of this H-Point test is to audit the seat being tested for compliance to design H-Point and torso angle.

5.2.2. Positioning Seat to Design H-Point. In order to position the seat to design H-Point, a Coordinate Measuring Machine (CMM) must be used to match the position of the seat with the design position specified in the Computer Aided Design (CAD) file of the seat being tested. General Motors Seat Performance Lead or Design Release Engineer will provide this reference data. This reference data will lock the degrees of freedom of the frame. An example of this reference data is shown in Appendix A (see Figure A1 and Figure A2).

This provided reference data will provide position data for specified hard points on the seat and/or vehicle, such as door latch points or mounting bolts and reference points on the seat components.

With the positioning information provided, seat will need to be adjusted with the aid of the CMM until the seat is at design position.

After being set, points used to position seat to design position should be probed and recorded. This allows the operator to check setup accuracy.

5.2.3 Default Settings. Any adjustable features must be set to their design position. These features include, but are not limited to: adjustable bolsters, adjustable lumbar, cushion length adjuster, head restraint and shoulder pivot, cushion tilt.

5.2.4 Oscar HPM Setup.

5.2.4.1 Oscar HPM Diagram. A labeled diagram of the HPM is shown in Figure 2.