



SURFACE VEHICLE RECOMMENDED PRACTICE

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Benchmark H-Point Procedure

RATIONALE

This document provides a procedure for determining a benchmark SgRP for vehicles where design intent information is unknown. This procedure was developed using modified procedures from the SAE J4003 OCT2008 document for determining H-point in benchmark vehicles using the HPM II as well as procedures from the SAE J1516 DEC1998 document regarding accommodation tool reference point.

Specific elements included in the Benchmark SgRP document:

- Modifications of the SAE J4003 procedure account for physical installation differences between the HPM I and HPM II in the cushion pan, back pan and leg assemblies.
- Modifications of the SAE J1516 document account for the SAE recommended practice using the BOFRP located on the shoe rather than the BOF reference located on the pedal introduced in SAE J4002.
- Procedures are included for the setup and alignment of the vehicle.
- Procedures are included to account for changes in the cushion angle that occur in seats with independent lift and tilt mechanisms.
- Procedures are included for determining the H-point travel box.

1. SCOPE

This procedure provides a method of determining a benchmark SgRP position for adjustable Driver's seats in Class A vehicles where the design intent information is not available. Class A vehicles include passenger cars, multipurpose passenger vehicles, and vans with Seat Heights (H30) greater than 127 mm and less than 405 mm for the purposes of this document. Once the Driver's Seat Benchmark SgRP is determined other seating positions can be readily benchmarked based on the standard procedures.

This document references installation procedures using the SAE J826 H-point Machine. If desired the document can be adapted to use the HPM-II by substituting the appropriate SAE J4002 installation procedures. In that case, the use of the HPM-II should be clearly documented. Since the SgRP is the basis for many interior benchmark dimensions this information can be used to assess or compare vehicle interiors in a standard repeatable way based on the packaging limitations of the property.

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2. REFERENCES

2.1 Applicable Documents

The following publications form a part of this specification to the extent specified herein. Unless otherwise indicated, the latest issue of SAE publications shall apply.

2.1.1 SAE Publications

Available from SAE International, 400 Commonwealth Drive, Warrendale, PA 15096-0001, Tel: 877-606-7323 (inside USA and Canada) or +1 724-776-4970 (outside USA), www.sae.org.

SAE J182	Motor Vehicle Fiducial Marks and Three-Dimensional Reference System
SAE J826	Devices for Use in Defining and Measuring Vehicle Seating Accommodation
SAE J1100	Motor Vehicle Dimensions
SAE J4002	H-Point Machine (HPM-II) Specifications and Procedure for H-Point Determination - Auditing Vehicle Seats

3. DEFINITIONS

Terms used in this document but not defined in this document are defined in SAE J1100. Where appropriate, added explanation is provided.

3.1 ACCELERATOR HEEL POINT, AHP

3.2 ANKLE (FOOT) ANGLE, A46

3.3 BALL OF FOOT, BOF

3.4 BALL OF FOOT REFERENCE POINT, BOFRP

3.5 CUSHION LIFT

A seat adjustment that raises the entire seat cushion or just the rear portion of the cushion.

3.6 CUSHION TILT

A seat adjustment that raises just the portion of a seat cushion to increase the cushion tilt angle.

3.7 DRIVER'S BOF TO SGRP, L99

Longitudinal distance between the driver's Ball of Foot and SgRP.

3.8 H-POINT

The H-Point is located on the centerline of the H-Point machine midway between the H-Point sight buttons on either side of the machine.

3.9 HIP ANGLE, A42

3.10 KNEE ANGLE, A44

3.11 SEAT HEIGHT, H30

Vertical distance from the SgRP to the appropriate heel reference.

3.12 SEATING REFERENCE POINT, SGRP

3.13 SHOE PLANE ANGLE, SPA

3.14 THIGH ANGLE, A57

3.15 TORSO (BACK) ANGLE, A40

4. PREPARATION AND SETUP

When benchmarking vehicles, bucks (vehicle mock-ups), seats or seat assemblies with the HPM, the following considerations apply:

4.1 Temperature and Relative Humidity

Since seat coverings and foam may respond differently to the weight of the HPM depending on temperature and humidity, the test environment should be conditioned as specified in 5.3.2 of SAE J826.

4.2 Vehicle Alignment

To establish a repeatable condition the vehicle property shall be leveled and suspension shall be blocked out prior to any HPM installation or measurement. Since the benchmark process does not provide design fiducial points, common methods and benchmark fiducial points should be established to reasonably set a level condition. Specific points and methods used shall be documented with the results.

4.2.1 Lateral alignment may be set by matching the height of common points located on the driver and passenger sides of the vehicle. Typical reference points and regions used for this purpose include:

- Front or Rear seat mounts
- Door striker mounts or hinges
- Vehicle Lift Points
- Side Window openings/B-Pillar

4.2.2 There are no common reference points that can be used to set a fore-aft alignment between benchmark vehicles. Two common methods have been used to set a repeatable fore-aft condition:

- Level the rocker panels in the fore-aft direction or
- Maintain the angle measured from a surface or between two fiducial points under specified loaded conditions.

NOTE: Unless otherwise directed the Curb Load conditions defined in SAE J1100 shall apply.

4.2.3 Vehicle jacks or similar devices shall be used to set this level condition and to secure the vehicle by blocking out the vehicle suspension to prevent undesired vertical movement during the benchmarking procedure.

4.3 Grid Reference

Once the vehicle is blocked and level, a reference coordinate system should be established based on the standard SAE coordinate Axis system established in SAE J182 where:

- X represents the fore-aft direction
- Y represents the lateral direction
- Z represents the up-down direction
- A coordinate point defining the origin (0,0,0). For Benchmarking this may be any arbitrary point in space but it is typically located near the driver compartment for convenience such as the front outboard seat mounting point.

Measurements can then be determined relative to this three-dimensional coordinate reference system.

4.4 Accelerator Pedal

The accelerator pedal shall be held in an undepressed position using blocks or other methods (such as a clamp on the accelerator cable) that prevent the pedal from moving.

If the pedal pad rotates about a pivot, independent of throttle movement, fix or block the pedal arm movement but allow the pad to pivot.

If pedals adjust fore-aft, set the pedal to the most-forward adjustment position in the vehicle (farthest from occupant).

4.5 Seat Break-In

If the seat to be checked has never been sat upon, the seat break-in and recovery procedure should be followed as specified in 5.3.2 of SAE J826.

4.6 Seat Recovery

Prior to the installation of the HPM, seats should remain unloaded for 30 minutes to allow the seat and seat materials (e.g., foam) to recover from compression.

4.7 Floor Mats

Floor mats should be removed unless they are considered standard equipment as specified in SAE J1100.

5. DRIVER'S SEAT BENCHMARK SGRP PROCEDURE

- 5.1 Adjust the seat to the Rearmost Lowest Position (RLP). Ensure all lift or tilt settings are set to the lowest condition, the recliner is set to a typical angle, and all other adjustable features are set to an off or retracted condition.

For seats with cushion tilt adjustment, adjust the Cushion Tilt as specified below and illustrated in Figure 1 to determine the Mid-Cushion Tilt Angle.

NOTE: The cushion tilt angles may be determined using two fixed seat reference points that travel with the cushion tilt adjustment or an inclinometer fixed to the adjustable portion of the seating surface.

- 5.1.1 Determine the Cushion Tilt Angle at Rearmost Lowest Position (RLP). This corresponds to the Lowest Cushion Tilt position.
- 5.1.2 Adjust the Cushion Tilt only to the Highest Tilt position and determine the Cushion Tilt Angle.