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SURFACE VEHICLE RECOMMENDED PRACTICE

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Driver Hand Control Reach

RATIONALE

This document has been revised with minor editorial corrections to the Definitions, and to comply with the SAE 5-year review policy. A recent history of changes to this document has been added to Appendix A.

1. SCOPE

This recommended practice describes boundaries of hand control locations that can be reached by a percentage of different US driver populations in passenger cars, multi-purpose passenger vehicles, and light trucks (Class A vehicles). This practice is not applicable to heavy trucks (Class B vehicles).

1.1 Introduction

The description of driver hand control reach envelopes was developed using data acquired from test subjects performing reach tasks in test fixtures simulating a range of actual vehicle configurations [Hammond and Roe, 1972; Hammond, et al, 1975]. The test subjects included equal numbers of men and women selected to represent the (United States) driving population on the basis of stature and age, and were tested both with and without an upper torso three-point restraint (the torso restraint was a diagonal non-extending shoulder strap attached separately to the lap belt; it was not a continuous loop system). The envelopes constructed using the non-extending shoulder and lap belt are meant to define a restrained hand reach, and the envelopes constructed using the lap belt only describe an unrestrained hand reach. The hand reach envelopes are three-dimensional surfaces described in table form and can be referenced to a particular vehicle seating configuration as described in Sections 5 and 6. The tables contained in this practice describe the boundaries to which at least 95% of US drivers can reach, based on the underlying data.

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 J826 Devices for Use in Defining and Measuring Vehicle Seating Accommodation

SAE J1100 Motor Vehicle Dimensions


2.2 Related Publications

The following publications are provided for information purposes only and are not a required part of this SAE Technical Report.

2.2.1 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 J941 Motor Vehicle Drivers’ Eye Locations
SAE J1052 Motor Vehicle Driver and Passenger Head Position

3. DEFINITIONS

3.1 SAE J1100 DEFINITIONS

Accelerator Heel Point (AHP)
H-point
Actual H-point
Centerline of Occupant (C/LO, at Y-coordinate of SgRP)
Seating Reference Point (SgRP)
Steering Wheel Center
H17, Accelerator Heel Point (AHP) to Steering Wheel Center
H30-1, Seat Height (SgRP to AHP, z)
L53-1, SgRP to Heel (AHP, x)

Whenever H30 and L53 are used in this document, they apply to the driver seating position. The suffix “-1”, which is used in SAE J1100 to designate the front seating row, is herein omitted from the dimension.

3.2 DRIVER HAND REACH CAPABILITY

Maximum reach capability of 95% of drivers in a simulated driving situation with the non-reaching hand on the steering wheel and the right foot on the accelerator pedal.

3.3 BASIC REACH TASK

Hand reach to a forward mounted control with the control held in a three-finger grasp. See Figure 1.
3.4 HAND REACH ENVELOPE

Geometric description of the hand reach capability for a specified proportion of a driver population and type of torso restraint system. The contour of the hand reach envelope refers to the geometric center of the control knob face. If the control knob face is at, or rearward of, the contour, it is estimated that at least the specified proportion of the indicated driver population can reach and operate the control [Hammond and Roe, 1972].

3.5 HAND REACH REFERENCE PLANE (HR PLANE)

Vertical reference plane extending laterally across the vehicle (an X-plane) used to properly position the hand reach envelopes with respect to the geometry of the vehicle seating configuration. The horizontal location of the HR plane rearward of the Accelerator Heel Point depends on the value of the General Package Factor (G) as shown below:

\[ HR = 786 - (99) G, \text{ mm} \]  
(Eq. 1)

3.6 GENERAL PACKAGE FACTOR (G)

Single index value that characterizes the geometry of the driver seating configuration for a particular vehicle. See Figures 2 and 3.