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Motor vehicle main dimensions measurement method

汽车主要尺寸测量方法

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Motor vehicle main dimensions measurement method

1 Scope

This Standard specifies motor vehicle main dimensions measurement method.

The external dimensions and luggage/ cargo dimensions measurement methods that are specified in this Standard are applicable to M and N vehicles; other vehicles can implement by reference.

The internal dimensions measurement methods that are specified in this Standard are applicable to M1 vehicles; other vehicles can implement by reference.

2 Normative references

The following documents are indispensable for the application of this document. For dated references, only the dated version applies to this document. For undated references, the latest edition (including all amendments) applies to this document.

GB 1589, Limits of dimensions, axle load and masses for motor vehicles, trailers and combination vehicles

GB/T 3730.2, Road vehicle – Masses - Vocabulary and codes

GB/T 3730.3-1992, Motor vehicles and towed vehicles - Dimensions of vehicles - Terms and definitions

GB/T 19514, Passenger cars - Luggage compartments - Method of measuring reference volume

GB/T 29120-2012, Procedure for H-point and R-point determination

3 Terms and definitions

Terms and definitions determined by GB 1589, GB/T 3730.2, GB/T 3730.3-1992, GB/T 29120-2012, and the following ones are applicable to this document. For ease of use, some of the terms and definitions in GB/T 29120-2012 are repeated below.

3.1 Vehicle coordinate system

In HPM, the seat is located at the ride base point that is specified by the manufacturer. When HPM uses the appropriate leg length, measure the H-point at the hinge center of its torso line and thigh bar centerline. In HPM-II, the seat is located at the ride base point that is specified by the manufacturer. When HPM-II adopts a proper posture, measure the H-point at the hinge center point of its seat plate assembly and back plate assembly.

[GB/T 29120-2012, Definition 3.3.2]

3.2.3 R-point

The designed H-point position that is set by the manufacturer, which is specifically designated as the R-point or SgRP and meets all the following requirements:

- a) the basic base point that is used to establish passenger adjustment tools and dimensions;
- b) simulate the hinge center position of the human torso and thigh;
- c) have a coordinate that is established relative to the structure of the designed vehicle;
- d) establish the rear end of each designated seating position or the H-point of the normal driving and seating positions that are designated by the manufacturer, which takes into account all the adjustment states of the seat, including horizontal, vertical and tilt, but does not include seat movement that is used for abnormal driving or seating purposes.

3.2.4 H-point travel path

All possible positions of H-point under all adjustment states (including horizontal, vertical and tilt) of the specified seating position.

[GB/T 29120-2012, Definition 3.9]

3.2.5 Three-dimensional H-point machine; HPM

The device that is used to measure the actual H-point and the actual torso angle on a vehicle.

[GB/T 29120-2012, Definition 3.1]

3.2.6 Three-dimensional H-point machine-II; HPM-II

The new SAE (Society of Automotive Engineers) H-point machine that is used to more accurately determine the actual H-point, actual torso angle and other parameter values on a vehicle. The main change of HPM-II is the improved

3.3.3 Thigh line

In the Y-plane, the line that connects the K-point to the H-point on the H-point measurement machine, as shown in Figure 2.

3.3.4 Torso line

In HPM, the centerline of the probe stick when the head-space probe sticks back to the HPM back plane.

In HPM-II, the straight line that passes through the H-point and the chest sliding hinge axis, as shown in Figure 2.

Note: In HPM, the torso line crosses the H-point and is parallel to the flat part of the back plate that determines the torso angle.

[GB/T 29120-2012, Definition 3.4]

3.3.5 Ankle point

The hinge point of the footwear and the leg on the H-point measurement machine, as shown in Figure 2.

3.3.6 Heel of shoe; HOS

When the passenger's seat is located at the R-point, the intersection OF the right side of the H-point measurement machine AND the pressed floor covering or other support surface of the heel, as shown in Figure 2.

3.3.7 Ball of foot; BOF

On the bottom of shoe, the point on the lateral centerline of the shoe that is 203 mm away from HOS, as shown in Figure 3.

Figure 4 -- Short-coupled seating interference and FRP positions

3.3.15 Steering wheel center

When the front wheels are straight forward, the intersection of the upper surface of the steering wheel rim and the centerline of the steering column.

3.3.16 Center line of occupant

Y-coordinate plane for each designated seating position R-point.

Note: For single-seat, it generally refers to the center plane of the seat. For bench seat, the center line of occupant is specified by the manufacturer.

3.4 Seat layout types

3.4.1 Long-coupled seating

When the front row of seats is in the designed position and the H-point measurement machine is located on the left outer seat in the rear row, the two consecutive two rows of seats (from the first row to second row, or from the second row to third row, etc.) whose continuous distance in the X-axis direction from the front row of seats is sufficient to place the H-point measurement machine whose ankle angle is greater than 130°.

3.4.2 Standard-coupled seating

When the front row of seats is in the designed position and the H-point measurement machine is located on the left outer seat in the rear row, the two consecutive two rows of seats (from the first row to second row, or from the second row to third row, etc.) whose continuous distance in the X-axis direction from the front row of seats is sufficient to place the H-point measurement machine whose ankle angle is not greater than 130°.

3.4.3 Short-coupled seating

When the front row of seats is in the designed position and the H-point measurement machine is located on the left outer seat in the rear row, the consecutive two rows of seats that interfere with the front-seat trim or seat structure when the shoe or leg model of the H-point measurement machine is at the minimum limiting position in the X-axis direction.

Note: As shown in Figure 4: at least one of the occupant's effective legroom (L51), the occupant leg clearance (L58) or the minimum knee clearance (L48) will be affected by the short-coupled seating.

3.5 Body design terms

4.2.4 Unless otherwise specified, when the motor vehicle is equipped with adjustable or movable parts, it shall be measured in the following prescribed state:

- a) The cargo fence shall be closed;
- b) The doors, engine hood, luggage compartment cover and vent cover are all closed;
- c) The radio antenna shall be retracted;
- d) It excludes the car license plate, but includes the car license plate holder (frame);
- e) If the steering wheel is adjustable, it shall be adjusted to the position that is specified by the manufacturer; if it is not specified by the manufacturer, it shall be adjusted to the middle position of the adjustable range;
- f) The vehicle pedal shall be in the free position; for adjustable pedal, it shall be adjusted to the maximum or forward position that is specified by the manufacturer;
- g) The vehicle seats shall be adjusted as follows:
 - 1) For height-adjustable headrests, unless otherwise specified, it shall be adjusted to the highest position;
 - 2) If the seat is adjustable horizontally and vertically, it shall be adjusted to the R-point or the position that is specified by the manufacturer;
 - 3) If the backrest is adjustable, it shall be adjusted to the fully retracted position;
 - 4) If the cushion angle is adjustable, it shall be adjusted to the angle that is specified by the manufacturer;
 - 5) If the seat back angle is adjustable, the first row of seats shall be adjusted to 22° or the angle that is specified by the manufacturer; the second and third rows of seats shall be adjusted to 25° or the angle that is specified by the manufacturer;
- h) If other parts are adjustable, they shall be adjusted to the position that is specified by the manufacturer.

4.3 Measurement benchmark

4.3.1 Unless otherwise specified, the length shall be measured on a straight line parallel to the X-axis direction; the width shall be measured on a straight

line parallel to the Y-axis direction; the height shall be measured on a straight line parallel to the Z-axis direction.

4.3.2 If the sides of the vehicle are symmetrical, measure only the left or right side.

4.3.3 Unless otherwise specified, the internal dimensions of the vehicle shall be measured on the center line of occupant. When the H-point measurement machine is used for measurement, it should use HPM-II, and the leg length should be adjusted to the position of the 95th percentile. In order to make the measurements consistent, it should use the formula for the H-point travel path of the seat that is given in Appendix B.

4.3.4 For the determination methods of the long-coupled, standard-coupled and short-coupled seating types, see Appendix C. During the measurement of long-coupled and standard-coupled seating, the H-point measurement machine is recommended to use the 95th percentile; other types can be specified by the manufacturer.

4.4 Precision requirements of measurement tools

During the measurement, direct or indirect measurement machines can be used for measurement. The unit and precision of measurement tools are shown in Table 1.

Table 1 -- Unit and precision of the measurement tools

Measurement tool	Unit	Precision
Length measurement tool	mm	± 1 mm
Width measurement tool	mm	± 1 mm
Height measurement tool	mm	± 1 mm
Angle measurement tool	$^{\circ}$	$\pm 1^{\circ}$

5 Dimension codes

5.1 Dimension codes and definition

The capital letters in Table 2 indicate the measured dimension classification code.

Table 2 -- Dimension codes and definition

Dimension codes	Definition
L	Length dimension or X-coordinate
W	Width dimension or Y-coordinate
H	Height dimension or Z-coordinate
A	Angle
SL	Seat length dimension

5.3.3 Luggage compartment/ cargo dimension suffix

For vehicles that can increase the luggage compartment/ cargo volume after the seat is folded, for the same category of luggage compartment/ cargo dimensions that are involved in different rows of seats, keep the letters and numerical codes the same; add the suffix in Table 6 to distinguish the measurement positions.

Table 6 -- Luggage compartment/ cargo dimension suffix

Suffix	Designated seat position
-1	Space from the luggage compartment/ cargo to the first row of seats
-2	Space from the luggage compartment/ cargo to the second row of seats
-3	Space from the luggage compartment/ cargo to the third row of seats
Note: For vehicles of multi-row of seats, add the dimension suffixes of corresponding rows, such as -4, -5, as required.	

5.3.4 Special suffix

For the internal dimensions, external dimensions, luggage compartment/ cargo or rear component dimensions, some special measurement conditions and measurement positions in the special dimensions of motor vehicle, keep the letters and numerical codes consistent; add the special suffix in Table 7 to distinguish the conditions or positions.

Table 7 -- Special suffix

Special suffix	Measurement conditions or measurement positions
-C	Center of occupant positions
-L	Vehicle left side
-R	Vehicle right side
-CV	The sunroof or ceiling is folded or retracted
-GVM	Gross vehicle mass condition
Note: Unless otherwise specified, for the case where the positions on both sides of the vehicle are symmetrical and only one side is measured, special suffix may not be used.	

6 Determination of the zero plane and the base point

6.1 Determination of the zero plane

Dimensions in Table 8 are used to determine the zero plane of the vehicle.

Table 8 -- Determination of the zero plane

Dimension codes	Name	Measurement method	Figures and notes
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