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Test method for vehicle running deviation

车辆行驶跑偏试验方法

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1 Scope

This Standard stipulates the conditions and methods of the running deviation distance test of vehicle when it runs on a straight road at a constant speed.

This Standard applies to type-M and type-N vehicles.

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/T 12534, Motor vehicles - General rules of road test method

GB/T 15089, Classification of power-driven vehicles and trailers

3 Requirements

Terms and definitions determined by GB/T 15089 and the following ones are applicable to this document.

3.1 Vehicle running deviation

When the vehicle runs straight on a straight road at a constant speed of 60 km/h, under the condition that the driver does not apply any external force to the steering wheel, the phenomenon that the vehicle cannot maintain a straight-line running state and deviates on its own.

3.2 Running deviation distance

The vertical distance that the vehicle deviates from the axis of the driving direction at the starting point of measurement.

Note: in meters (m).

3.3 Running deviation angle

The difference of the angle between the driving direction of the vehicle and the road centerline at the start and end points of measurement.

4.4.1 General requirements

The vehicle shall be clean; the windows and the ventilation devices in the passenger compartment shall be closed. Unless there are special requirements for the test vehicle, the driving mode shall be the normal driving mode that is recommended by the car manufacturer.

4.4.2 Tire

The tire pressure is charged to the value that is specified by the car manufacturer. The model, tread pattern, pattern depth and tire pressure of the coaxial left and right tires shall be consistent. The tread pattern depth of the tire shall not be less than 50% of the initial tread pattern depth.

4.4.3 Load state

The vehicle is of complete vehicle kerb mass, except for the driver and testing equipment.

4.5 Others

Other test conditions and test vehicle preparations shall comply with the provisions of GB/T 12534.

5 Test method

5.1 Test process

5.1.1 Accelerate the test vehicle to 60 km/h along the center line of the test road as shown in Figure 1, and then travels straight to point A at a uniform speed of 60 km/h.

5.1.2 When the front end of the vehicle reaches point A, both hands release the steering wheel, to keep the vehicle at a speed of (60 ± 2) km/h to the end point P_n. At point A, after both hands release the steering wheel, the yaw rate of the vehicle shall be no more than 2 (°)/s.

5.1.3 Start sampling from point P_0 at a certain sampling frequency (20 Hz is recommended) and collect data (including vehicle speed, direction, position) from point P_1, P_2, ..., to point P_n.

5.1.4 In order to eliminate the influence on the vehicle running deviation distance from the residual force on the steering wheel when entering the running deviation test area, if the distance between point A and point P_0 is not less than 40 m, collect no data.

d) The running deviation distance ΔL is:

$$\Delta L = | Y_n'' - Y_n' | = | | Y_n' - Y_0 | - | (X_n' - X_0)\tan\theta_0 | | \approx \frac{VT\sin\theta + VT\sin 2\theta + \ldots + VT\sin n\theta}{3.6} \quad \ldots\ldots\ldots\ldots (2)$$

Where:

ΔL -- the running deviation distance, in meters (m);

a, a_1, ..., a_4 -- the constant coefficients after fitting;

n -- number of monitoring points in the running deviation test area;

(X_n, Y_n) -- the coordinates of the tested vehicle running deviation at the end of the monitoring area, in meters (m);

(X_n', Y_n') -- the coordinates of the corrected vehicle running deviation locus at the end of the monitoring area, in meters (m);

(X_n'', Y_n'') -- the coordinates of the tested vehicle at the end of the monitoring area if there is no running deviation, in meters (m);

V -- the measured vehicle speed, in kilometers per hour (km/h);

T -- the time difference between two adjacent monitoring points, in seconds (s);

θ -- the running deviation angle of the vehicle within the unit time T at the measured vehicle speed V, in degrees (°);

θ_0, …, θ_n -- the angle between the driving direction of the vehicle and the road centerline at the corresponding monitoring point, in degrees (°);

Δθ -- the total running deviation angle after correction, in degrees (°);

$\Delta\theta_1$, …, $\Delta\theta_n$ -- the running deviation angle of the vehicle at the monitoring points P_1, P_2, ..., P_n relative to the previous monitoring point, in degrees (°).

5.2.2 Test result

The running deviation distance in the test result is accurate to 0.01 m.

If the difference between the maximum and minimum correction results of the three running deviation distances in the same direction is not more than 0.1 m, the test results are considered valid.

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