

A. Fuel Consumption Tests

I. Level-Road Consumption

The level-road consumption of a motor vehicle is determined under certain definite conditions laid down in a DIN standard. Under ordinary conditions it is hardly possible to achieve level-road consumption since the varying operating conditions resulting from traffic and road conditions, driving habits, weather influences, tire condition, and tire pressure have an unfavorable influence and increase fuel consumption. Nevertheless the level-road consumption figure is of considerable importance since it makes it possible to compare cars of various types under uniform standard conditions.

When determining level-road consumption, the following conditions must be strictly observed:

a) Vehicle

The vehicle and all its parts, including carburetor setting and ignition timing, must be of the standard type.

It must be fully loaded (permissible total weight approx. 1650 kg).

The engine and the vehicle must be run in. Before the actual test the vehicle should be run for a sufficient period of time to allow engine, transmission, and rear axle to reach their normal operating temperatures (cooling water temperature approx. 80° C).

Note: During the cold season test runs should not be made when the outside temperature is below —5° C.

b) Route

Runs should be made on a level freeway stretch (short gradients of max. 1.5%) approx. 20 km long, on a windless day (maximum wind velocity 2—3) in opposite directions. The runs must be made without any intervening time lag.

The exact distance covered should be determined by means of the road mileage signs and the stopping distance of the vehicle should not be taken into consideration.

c) Speed

The speed should be kept constant as far as possible at two thirds of the maximum speed, but should not exceed 80 km/h. The car should be driven in top gear over the whole stretch.

d) Fuel

The car should be run on the fuel prescribed in the operating instructions. For knock-free operating the engine of Model 190 requires commercially sold fuels of a minimum octane rating of 86 according to the research method (ROZ).

e) Fuel Consumption

The amount of fuel consumed during the test run should be determined by means of a fuel-mileage tester which can be switched from the 'run' to the 'test' position from the beginning and to the end of the test route. With a 10% increase for unfavorable conditions the level-road consumption is then determined in accordance with the equation

$$k_n = 110 \frac{K}{W} \text{ (liters/100 km)}$$

where k_n = level-road consumption in liters/100 km

K = fuel consumption in liters

W = test route in km

The level-road consumption of Model 190 has been officially tested as on all our other models. To make allowance for inevitable differences in test conditions, all measuring tests should be based on a + 5% tolerance.

Under these conditions, the measured level-road consumption of Model 190 is 8.9 liters/100 km.

In practice it is almost impossible to fulfill the conditions laid down for measuring level-road consumption.

II. Fuel Consumption According to German Standard DIN 70 030

In order to adapt fuel consumption tests to present conditions and to developments in automotive engineering, a revised edition of the DIN Standard 70 030 was issued in August 1956.

As compared with the previous edition of the Standard for determining level-road consumption of motor vehicles (April 1952), the new edition contains the following changes:

- a) The title was changed from "Kraftstoffnormverbrauch" (level-road consumption) to "Kraftstoffverbrauch nach DIN 70 030" (fuel consumption according to DIN 70 030).
- b) The load during the test run was decreased to half the difference in weight between the permissible total weight and the curb weight (in the case of Model 190 = 225 kg) instead of the permissible total weight.
- c) The test distance was shortened from 20 km to 10 km.
- d) The speed was fixed at $\frac{3}{4}$ instead of $\frac{2}{3}$ of the maximum speed as determined in accordance with DIN 70 030. The maximum permissible test speed was increased from 80 km/h to 110 km/h.

A comparatively large number of test runs is necessary in order to determine accurately the value of fuel consumption according to DIN 70 030. The accurate figure for the fuel consumption according to DIN 70 030 of Model 190 will be announced as soon as the official tests have been concluded.

In practice it is hardly ever possible to fulfill in every detail the conditions laid down for measuring level-road consumption and fuel consumption according to DIN 70 030. It is much more convenient therefore to measure partial load consumption (see Section III) or overall consumption (see Section IV).

III. Fuel Consumption Curve (Partial Load Fuel Consumption)

For obvious reasons, not only the level-road consumption of a car but also its fuel consumption at other speeds is of great interest. For this reason we give in addition to the level-road consumption figure a fuel consumption curve, the so-called partial load consumption curve (Fig. 00 — 4/1). The values plotted in the graph are derived from measurements.

At the various test speeds, fuel consumption is determined by running the vehicle over a 1 km stretch of level freeway in opposite directions. As a rule it is sufficient to take measurements at speed intervals of 20 km/h.

The partial load consumption curve is determined on runs made with two persons in the car and with a full fuel tank. When checking the partial load consumption, which is the most reliable indication of the car's actual consumption, the following conditions must be observed: