

IV. Overall Fuel Consumption

To determine overall fuel consumption, which is the amount of fuel consumed on a fairly long stretch and under normal traffic conditions, it is advisable to select a circuit of approx. 100 km over ordinary roads. Measurements over shorter stretches are useless since traffic conditions, driving habits, and road conditions are bound to have an adverse effect. It goes without saying that the test route must be known to have exactly the required length.

The test route should be covered under normal traffic conditions and at a fairly constant speed, fuel consumption should be measured and the run should be accurately timed.

Overall fuel consumption is determined by means of the equation

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

where k_s = overall consumption in liters/100 km

K = fuel consumption in liters

W = test route in km

The average speed is

$$v = 60 \frac{W}{t} \text{ km/h}$$

where v = average speed in km/h

W = test route in km

t = time in minutes required for the test run

In evaluating the measurements, attention should be given to the fact that even on such a long test route, consumption depends to a large extent on traffic conditions and above all on driving habits. For this reason consumption tests should always be made by the same driver, who must be an experienced expert, and the vehicle should always carry two persons or the driver plus 65 kg of weight. After selecting a stretch of accurately known length it is advisable to cover the distance several times in a car in good working order and to measure fuel consumption at different average speeds. These consumption figures can then be used as a basis for measurements carried out with other cars.

At a rough estimate, overall fuel consumption at a given average speed can be assumed to equal partial load consumption at a speed 20—25 km higher.

Example: At a measured average speed of 60 km/h permissible overall fuel consumption can be roughly as much as the partial load consumption at a speed of 80 to 85 km/h (see Fig. 00—4/1). The partial load curve would in this case indicate a permissible overall consumption of 8.1—8.5 liters/100 km.

V. Testers

Various firms manufacturing automobile accessories have brought a number of fuel-mileage testers on the market which are suitable for measuring fuel consumption (partial load consumption). Most of these testers have a capacity of 0.5—1 liter. The tester is connected via a three-way cock to the fuel tank and to the fuel feed pump. With this arrangement it is possible to use fuel from the fuel tank even when the tester is connected so that the car can be driven to the test route with the tester installed.

The tester is filled by switching the cock to the "fill" position. One of these testers which we find very useful for the purpose is the fuel-mileage tester produced by Messrs. V. Löwener of Cologne (Model VLC 1003 A) Fig. 00 — 4/2).

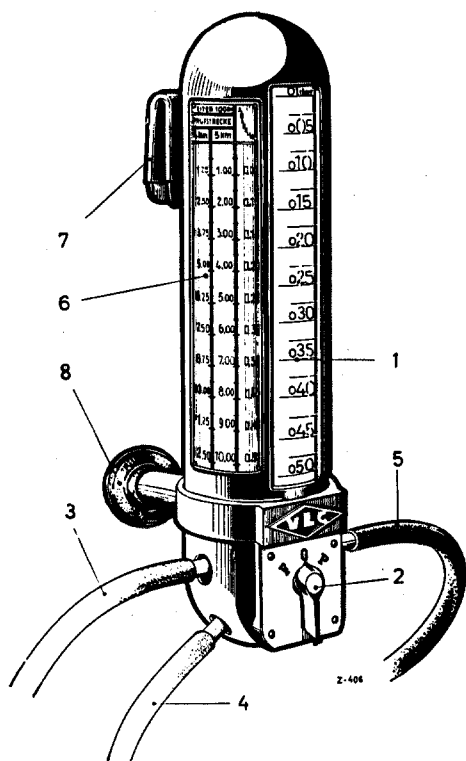


Fig 00 — 4/2

- 1 Graduated glass insert
- 2 Three-way cock
 - F = "Fill" position for filling the tester
 - 0 = "Run" position with fuel supplied from the fuel tank
 - P = "Test" position with fuel supplied from the tester
- 3 Connecting hose (red)
- 4 Connecting hose (white)
- 5 Connecting hose (black)
- 6 Conversion table
- 7 Hook
- 8 Rubber suction cups

The tester can be hooked over the side window by means of the hook (7) and is held in position by two rubber suction cups (8). Attach tube (3) to the suction side of the fuel feed pump (red tube), tube (4) to the supply line to the fuel tank (white tube) tube (5) to the second connection at the delivery side of the fuel feed pump (black tube).

For details see the instructions for use of the individual testers. By means of this tester the partial load consumption curve can be plotted with sufficient accuracy. However, for measuring overall consumption the capacity of this tester is not large enough. It is advisable therefore to use a gasoline can with a connection for a fuel hose welded into the bottom. An accurate calibrated measuring stick should be made for this can so that the fuel contents can be accurately determined. At the end of the test run, fuel consumption is measured by filling up the can.

The values thus determined should be entered in the data sheet for fuel consumption issued by our firm (see specimen on page 00 — 4/6). Complaints should always be accompanied by a carefully completed data sheet.

The Data Sheets can be obtained from our Untertürkheim factory, Export Service Department.

Data Sheet for Fuel Consumption		Model		Mileage					
Branch/Agent		Chassis No.:							
		Engine No.:							
		First licensed:							
		Owner:							
Measured by:		Date:							
Customer's complaint:									
Type of fuel:		Cooling water temperature C°							
Specific gravity:		Oil temperature: C°							
Weather conditions:		Outside temperature: C°							
Road condition:									
1. Fuel Consumption Under Partial Load Distance run = 1 km Load: 2 persons or driver + 65 kg weight									
Speed indicated by speedometer	km/h	20	40	60	80	100	120	140	160
Time recorded for 1 km	t sec.								
Actual speed $V_{\text{eff}} = \frac{1 \times 3600}{t}$	km/h								
Fuel consumption per km	liters								
Fuel consumption per 100 km	liters								
2. Overall Fuel Consumption Load: 2 persons or driver + 65 kg weight									
Recorded mileage after test run	 km							
Recorded mileage before test run	 km							
Distance run W	 km							
Fuel consumption K	 liters							
Time recorded t	 min.							
Overall fuel consumption $k = 100 \times \frac{K}{W} = 100 \times \text{.....} = \text{..... liters/100 km}$									
Average speed $v = \frac{60 \times W}{t} = 60 \times \text{.....} = \text{..... km/h}$									
<p>In practice it is hardly ever possible to measure level-road consumption and fuel consumption under the conditions laid down in DIN 70030. It is much more convenient to measure partial load consumption or overall consumption.</p> <p>For details on test runs see Workshop Manual Model 190, Job No. 00-4, Section A.</p>									