

## B. Oil Consumption Test Runs

The oil consumption of an engine can only be determined accurately by an oil consumption test run. Oil dip stick measurements are too inaccurate.

Since oil consumption depends to a large extent on driving habits i. e. engine load and engine speed, a test route should be selected for a circuit of approx. 100 km in order to simulate actual normal operating conditions. This test route should include 30 to 40 km of freeway or similar roads on which an average speed of 110 to 120 km can be maintained.

The whole test route should be covered at a certain average speed and the speeds laid down for the various laps should as far as possible be adhered to on other test runs. It is advisable always to have oil consumption test runs carried out by the same driver. The vehicle should carry 2 persons or the driver plus 65 kg of weight. When these conditions are observed, oil consumption can be determined with sufficient accuracy and the consumption of different engines can be compared.

Before the test run is carried out the engine must be very carefully checked for possible leaks, for instance at the oil filter, at the cylinder head cover, etc. Oil consumption should be determined as follows:

- a) Warm up the engine; oil temperature should be 75—80° C. The oil temperature should be measured with an Electric Distant-Reading Thermometer 000 589 21 27 whose heat feeler is put in the oil pan instead of the dip stick.
- b) Keep a clean vessel in readiness and weigh the empty vessel.
- c) Place the vehicle on a level surface and mark its position in such a way that after the test run the vehicle can be placed in the same position.
- d) Disconnect the main ignition cable from the ignition coil to the distributor at the ignition coil or take off the distributor cap.
- e) Unscrew the drain plug at the oil pan and **run the warm oil into the clean vessel for a period of 30 minutes**. The engine should be turned for about ten seconds by means of the starter motor after 15, 20, and 25 min. of draining.
- f) Screw in the oil pan drain plug and tighten.
- g) Weigh the vessel with the oil on a scale graduated in grams and fill up to the specified **weight of 3520 g** (corresponding to 4 liters).
- h) Carefully fill the weighed amount of oil into the engine, taking care not to spill any.  
**The vessel must be used again after the test run and should therefore not be cleaned or used for other purposes in the meantime since otherwise weight errors will result.**
- i) Drive the vehicle under the above-mentioned conditions for approx. 100 km.
- k) Place the vehicle in the previously marked position immediately after the test run.
- l) Disconnect the main ignition cable from the ignition coil or remove the distributor cap.
- m) Place the vessel previously used for the purpose under the oil pan, unscrew the oil pan drain plug and drain the oil. **Draining time is again 30 min.** Turn the engine by means of the starter motor for about 10 seconds after each 15, 20, and 25 min. draining. Screw in the drain plug and tighten.
- n) Weigh the vessel with the oil.
- o) Determine the oil consumption from the difference in weight between the two measurements before and after the test run.

Oil consumption ( $b_{oil}$ ) is usually given in liters and computed from the difference in weight as determined above, the specific gravity of the oil, and the distance run in accordance with the following formula

$$b_{oil} = \frac{\text{weight of oil consumed}}{\text{specific gravity of oil (g/cm}^3\text{) x distance run (km)}} \text{ liter/1000 km}$$

The specific gravity of the oil is 0.88 g/cm<sup>3</sup>

**Example:**

Weight of oil consumed: 100 g  
Distance run: 98 km

Oil consumption is accordingly

$$b_{oil} = \frac{100}{0.88 \times 98} = 1.16 \text{ liters/1000 km}$$

For Model 190 permissible oil consumption is up to 1.5 liters/1000 km = 1320 g/1000 km.

**The measurements and all necessary details should be entered in the data sheet issued by our firm (see specimen on page 00 — 4/9). All complaints should be accompanied by a carefully completed data sheet.**

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

<b>Data Sheet for Oil Consumption</b>		Model: .....	Mileage: .....							
Branch/Agent ..... .....		Chassis No.: .....								
		Engine No.: .....								
		First licensed: .....								
		Owner: .....								
Measured by: .....		Date: .....								
Customer's complaint: .....										
Distance run: .....		Weather conditions: .....								
		Road conditions: .....								
Cooling water temperature: ..... °C		Outside temperature: ..... °C								
Oil temperature: ..... °C		Oil pressure at idling speed: ..... kg/cm <sup>2</sup>								
Type of oil: .....		(with oil temperature measured)								
<p>Weight of empty vessel: ..... g</p> <p>Weight of vessel with oil* before test run: ..... g</p> <p>Weight of vessel with oil after test run: ..... g</p> <p style="padding-left: 40px;">Weight of oil consumed: ..... g</p> <p>* Specified weight of oil before test run:</p> <table style="width: 100%; border: none;"> <tr> <td style="width: 50%;">Models 180, 180 D = 3520 g;</td> <td style="width: 50%;">Model 300 Sc<sup>+</sup> = 8800 g</td> </tr> <tr> <td>Models 190, 190 SL = 3520 g;</td> <td rowspan="2">Model 300 SL<sup>+</sup> { = 9700 g, capacity 11 liters = 13200 g, capacity 15 liters</td> </tr> <tr> <td>Models 219, 220 a, 220 S = 5280 g;</td> </tr> <tr> <td>Models 300, 300 b, 300 c, 300 S = 5720 g;</td> <td>+ In the case of Models 300 Sc and 300 SL also weigh oil container</td> </tr> </table>				Models 180, 180 D = 3520 g;	Model 300 Sc <sup>+</sup> = 8800 g	Models 190, 190 SL = 3520 g;	Model 300 SL <sup>+</sup> { = 9700 g, capacity 11 liters = 13200 g, capacity 15 liters	Models 219, 220 a, 220 S = 5280 g;	Models 300, 300 b, 300 c, 300 S = 5720 g;	+ In the case of Models 300 Sc and 300 SL also weigh oil container
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Models 300, 300 b, 300 c, 300 S = 5720 g;	+ In the case of Models 300 Sc and 300 SL also weigh oil container									
<p>Recorded mileage after test run ..... km</p> <p>Recorded mileage before test run ..... km</p> <p style="padding-left: 40px;">Distance run ..... km</p>		<p>Remarks: .....</p> <p>.....</p> <p>.....</p> <p>.....</p>								
<p><b>Oil Consumption</b></p> $b_{oil} = \frac{\text{weight of oil consumed (g)}}{0.88^{**} (\text{g/cm}^3) \times \text{distance run km}} = \frac{\quad}{0.88 \times \quad} = \quad \text{liters/1000 km}$ <p style="text-align: center;">** Specific gravity of oil = 0.88 g/cm<sup>3</sup></p>										
<p><b>Measuring instructions</b> (For details see Workshop Manual Model 190, Job No. 00-4, Section B);</p> <ol style="list-style-type: none"> <li>1. Keep a clean measuring vessel for the oil in readiness and weigh the empty vessel.</li> <li>2. Warm up the engine to a maximum oil temperature of 80° C (measure the temperature).</li> <li>3. Place the vehicle on a level surface.</li> <li>4. Drain the oil into the measuring vessel, draining time 30 min. Turn the engine by means of the starter for about 10 seconds each after 15, 20, and 25 min. For this purpose remove the distributor cap in the case of gasoline engines and cover the intake connections in the case of diesel engines.</li> <li>5. Weigh the vessel with the drained oil and fill up with oil to the prescribed weight.</li> <li>6. Fill the weighed amount of oil into the engine without spilling.</li> <li>7. Make test run according to instructions.</li> <li>8. Drain the oil as described above and weigh.</li> </ol>										