

## DIAGNOSIS AND TESTING (Continued)

- Engine size
- Operator driving habits
- Ambient temperature
- Quality and viscosity of the oil

Operation under varying conditions can be frequently misleading. A vehicle that has been run for several thousand miles of short trip operation or below freezing ambient temperatures, may have consumed a "normal" amount of oil. However, when checking the engine oil level, it may measure up to the full mark on the dipstick due to dilution (condensation and fuel) in the engine crankcase. The vehicle then might be driven at high speeds on the highway where the condensation and fuel boil off. The next time the engine oil is checked, it may appear that a quart of oil was used in a hundred or so miles. This perceived 160 km (100 miles) per quart oil consumption rate causes customer concern even though the actual overall oil consumption rate was about 2400 km (1500 miles) per quart.

Make sure the selected engine oil meets the recommended API performance category "SG" and SAE viscosity grade as shown in the vehicle Owner Guide. It is also important that the engine oil is changed at the intervals specified for the typical operating conditions. Refer to Section 00-03, Maintenance and Lubrication.

The following diagnostic procedure is intended to be used to determine the source of excessive internal oil consumption.

1. Determine what is considered excessive oil consumption, i.e., how many miles are driven per quart of oil? Also, determine owner's driving habits, i.e., sustained high speed operation, towing, extended idle, etc.

Oil usage is normally greater during the first 7500 miles of service. As mileage increases, oil usage generally decreases. Vehicles in normal service should get at least 900 miles per quart after 7500 miles of service. High speed driving, towing, high ambient temperature etc. may result in greater oil usage.

**NOTE:** Vehicles over 8500 GVW will consume more oil.

2. Verify engine has no external oil leak as outlined under Engine Oil Leaks.
3. Verify engine has correct engine oil indicator dipstick.
4. Verify that the engine is NOT being run in an overfilled condition. Check the oil level at least 5 minutes after a hot shutdown with the vehicle parked on a level surface. In no case should the level be above the top of cross-hatch area and "F" in FULL. If a significant overflow is indicated, perform steps 5a through 5d.
5. Perform an oil consumption test:
  - a. Drain engine oil, remove filter and refill with one quart less than the recommended oil.

- b. Run the engine for three minutes (10 minutes if cold), then allow oil to drain for at least 5 minutes. (Vehicle on level surface)
- c. Remove engine oil dipstick and wipe clean. (Do not wipe with anything contaminated with silicone compounds). Re-install dipstick being sure to seat the dipstick firmly in the tube. Remove the dipstick and scribe a mark on the back (unmarked) surface at the indicated oil level. (This level should be about the same as the ADD mark on the face of the dipstick.)
- d. Add one quart of oil. Restart the engine and allow to idle for at least two minutes. Shut off the engine and allow oil to drain back for at least 5 minutes. Mark the dipstick using the procedure above. (This level may range from slightly below the top of the cross-hatched area to slightly below the letter "F" in FULL).
- e. Record vehicle's mileage.
- f. Instruct the owner to drive the vehicle as usual and:
  - (1) Check the oil level regularly at intervals of 100 to 150 miles.
  - (2) Return to the service point when the oil level drops below the lower (ADD) mark on the dipstick.
  - (3) In an emergency, add only full quarts of the same oil and note the mileage at which the oil is added.
- g. Check the oil level under the same conditions and at the same location as in steps c and d above.
  - (1) Measure the distance from the oil level to the UPPER scribe mark on the dipstick and record.
  - (2) Measure the distance between the two scribe marks and record.
  - (3) Divide the first measurement by the second.
  - (4) Divide the distance driven during the oil test by the result. This quantity is the approximate oil consumption rate in miles per quart (MPQ).
- h. If the oil consumption rate determined is unacceptable, proceed to Step 6.
6. Check PCV valve system. Make sure system is not plugged.
7. Check for plugged oil drain-back holes in cylinder head(s), and cylinder block.
8. If, after performing the above, the condition still exists, proceed to Step 9.
9. Perform a cylinder compression test as outlined, and/or perform a cylinder leak detection test with Tester 014-00705. This can be helpful in determining source of oil consumption, i.e., valves, piston rings, etc.