INSTALLATION PROCEDURE FOR
VOLVO D-SERIES HEAVY DUTY ENGINES

Procedure: Installing Evans waterless Heavy Duty Thermal Coolant (HDTC) and a ResistorPac into a Volvo D-Series engine

CAUTIONARY NOTE: DO NOT FLUSH COOLING SYSTEM WITH WATER!

REGARDING OLDER ENGINES: Metal to metal connections may be corroded. Do not apply force that can damage such connections and cause leaks.

Before ordering supplies, find out from Volvo which coolant temp sensor (CTS) is used in the engine to be converted. Use the last 7 digits of the VIN (A letter followed by 6 numbers) to make your inquiry. The choice of CTS part numbers is either 20513340 (generally, newer models) or 20576617 (generally, older models).

The stock fan-on temperature for D-Series engines using CTS P/N 20513340 is assumed to be 208°F. The correct Evans ResistorPac to raise the fan-on temperature to 230°F is Evans P/N RP-55.

The stock fan-on temperature for D-Series engines using CTS P/N 20576617 is assumed to be 195°F. The correct Evans ResistorPac to raise the fan-on temperature to 220°F is Evans P/N RP-44. (In general, Evans does not recommend raising the fan-on temperature more than about 25°F.)

The ResistorPac is placed in series with the coolant temperature sensor, raising the fan-on, fan-off, and derating temperatures by making the ECM “think” the coolant temperature is cooler than it really is. Coolant temperature gauges, that do not have a separate sensor, will indicate the temperature that the ECM thinks it sees, which, when the fan turns on, is about 22 to 25 degrees lower than the actual coolant temperature.

1. Supplies, information, and special tools needed:
   a. Obtain this information from the owner:
      1) What are the year, make and model of the truck?
      2) What are the last 7 digits of the VIN?
      3) Is the engine equipped with a coolant filter?
b. Obtain this information from a Volvo dealer:
   1) Is the coolant temperature sensor P/N 20513340 or is it P/N 20576617?

c. Purchase these items from the Volvo dealer:
   1) A non-chemical coolant filter (if the engine is equipped with a coolant filter).
   2) IMPORTANT: A Volvo P/N 1549651 o-ring for the thermostat flange. (The stock thermostat will be removed and later put back in. If the o-ring is not changed, the thermostat will leak.)

d. The following items are sourced from Evans Cooling Systems, Inc.: 888-990-2665
   1) Enough Evans Waterless Heavy Duty Thermal Coolant (HDTC). (16 gallons should suffice for a D-13.)
   2) Evans-provided labels to warn against the addition of water.
   3) EITHER an RP-55 ResistorPac (if the CTS is Volvo P/N 20513340) OR an RP-44 ResistorPac (if the CTS is Volvo P/N 20576617).
   4) Evans-provided Installation instructions for ResistorPacs (version 03-21-11 or later). Important: Gather the parts and tools listed in the ResistorPac installation instructions also.
   5) An Evans “Water-Chaser” P/N E2195, a device useful for inserting coolant for flushing.

e. A high-volume air source (rather than high pressure) such as Makita blower Model UB 1101, widely available from the internet. A shop doing installations commercially should consider a Model MB 3CD Master Blaster. A powerful (and clean) shop vac, used in the blower mode, is also an acceptable high-volume air source.

f. An angled pick for difficult hoses.

g. Funnels.

2. Place containers to catch drained coolant.

3. If the engine is hot, wait for it to cool to a safe temperature. Never open a cooling system pressure cap if the engine is hot.

4. Remove the pressure cap and drain coolant from the bottom of the radiator.

5. While the coolant is draining, remove air system ducting necessary to provide access to the thermostat housing.

6. When safety permits, pull off the bottom radiator hose completely and leave it to drain.
7. The following devices have “source” connections and “return” connections:

- Cab heater
- Sleeper heater
- Fuel tank heaters
- Fuel heater (at fuel filter)
- APU units

The returns all connect to the inlet side of the pump. In general, when air is blown into the source side of each device, old coolant is pushed out of the device, through its return line, and out the bottom radiator hose. Evans waterless coolant is introduced into each source side and blown through to chase residual coolant from each device.

8. Special device information:

a. Cab and sleeper heaters, in order to be drained properly, require that the temperature controls for these units be turned to MAX, the blowers turned ON, and the key ON.

b. The coolant to fuel tank heaters generally passes through a thermostatically controlled valve (sometimes labeled “Arctic”) that is probably closed. The connections must be opened downstream of the valve to blow out the coolant in the fuel tank heaters.

c. The APU unit may hold significant amounts of old coolant. In general, the air is blown into the outlet of the APU back through the unit and out the inlet side. There may be a thermostat in the APU that requires removal in order to blow coolant out the unit.

d. Look for the possibility of a transmission cooler that uses engine coolant that would need to be drained.

9. About the Volvo HD thermostat and the location of the thermostat cover.

A Volvo heavy duty engine thermostat has a shape and size that is very different from other HD engine thermostats. Evans does not have special higher temperature thermostats that fit Volvo HD engines. Volvo HD thermostats actuate at about 180°F (82°C). On D13 engines the cover for the thermostat is located at the very front of the cylinder head, just above the radiator fan and toward the RH side. On D12 engines the cover is located on the RH side of
the engine. The thermostat must be removed in order to remove residual coolant trapped by
the thermostat and to enable the blowing of air through the head and the block. In order to re-
use the thermostat later, the o-ring surrounding the thermostat flange must be replaced with a
new one. Failure to do so will result in a leak that will consume coolant and waste servicing
time.

10. Blowing air through the thermostat hole.

   a. Remove the thermostat cover.
   b. Remove the thermostat.
   c. Stuff a rag into the by-pass passageways of the thermostat housing. Leave the passages to
      the cylinder head open. The rag should be securely stuffed so that it cannot move into the
      by-pass by application of air pressure. If there is any question about that, attach a tether to
      the rag.
   d. Put the thermostat cover back on.
   e. Remove the top radiator hose at the radiator end.
   f. Blow air into the top radiator hose until coolant stops running out the bottom radiator
      hose.

11. Pour about ½ gallon of Evans waterless coolant into the top radiator hose and blow air into the
top radiator hose until coolant stops running out the bottom radiator hose.

12. If the engine is equipped with a coolant filter, remove it and blow air into the thermostat
housing until no fluid emerges from the filter housing. Install a new non-chemical coolant
filter.

13. Re-install the existing thermostat.

   a. Remove the thermostat cover and remove the rag.
   b. Install a new o-ring (Volvo P/N 1549651) on the flange of the thermostat.
   c. Insert the thermostat.
   d. Attach the thermostat cover.

14. Reattach any hoses and close any drains that are open.

15. Find the location of the coolant temperature sensor.

   a. On a D-13 it is on the RH side of the engine near the front, in the area of the by-pass
      plumbing, and it points downward.
   b. On a D-12 it is on the LH side of the engine at the back and it points outward,
      perpendicular to the engine.

16. Make sure you have selected the correct ResistorPac. (RP-55 if the CTS is P/N 20513340
    and RP-44 if the CTS is P/N 20576617)

17. Install the ResistorPac according to the “Instructions for Installing a ResistorPac”.

18. Police the hose connections one last time to assure that they are tight.

19. Fill the cooling system with Evans Waterless Heavy Duty Thermal Coolant (HDTC).
20. Operate the engine to assure the opening of the thermostats and thorough circulation of the coolant. Add coolant as required to maintain the “hot” level.

21. The coolant in the expansion tank will get hot due to the coolant entering the expansion tank from the vent line attached to the thermostat housing. The high temperature assures that the coolant in the expansion tank is well-circulated. A refractometer reading may be taken at the expansion tank under the following conditions:

- The thermostats are clearly open.
- The coolant in the expansion tank is hot.
- No coolant was recently added to the expansion tank.
- Alternatively, take the reading after several days of operation.

22. Measuring the water content with the refractometer.
   - Calibrate the refractometer by placing a drop of new HDTC on the refractometer glass and setting the reading to 55.70.
   - After cleaning the glass, place a drop of coolant, obtained from a location in the cooling system where the HDTC is well-mixed, on the glass.
   - The reading must be 54.40 or higher to verify that the water content is 3 percent or less (a required condition).

23. Place the labels to warn against the addition of water or water-based coolant.

24. The equipment is ready for use. Upon cool-down and for a couple of days, small amounts of coolant may be necessary. The expansion tank should be about 1/3 full when the engine is cold.

25. Use the same radiator cap without modifications. Although it is possible to run an open-vented system, the pressure cap will give you a virtually “sealed system”. Because there will be no vapor component, the pressure will remain quite low within the system (the only pressure will come from the expansion of the liquid against the air in the top of the expansion tank). It is unlikely that the pressure will ever breathe outward and that outside air will enter the system on a cool-down.

26. Bar’s Leaks Liquid Aluminum Stop Leak is compatible with Evans HDTC and is effective in stopping small leaks.

The procedures contained herein are subject to revision as techniques evolve that speed up the work and that conserve materials. The latest revision can be found on www.evanscooling.com. Evans Cooling Systems solicits suggestions from installers to help improve the procedures. If you have a suggestion, please call Tom Light 860-435-2418.

Note: As of the date of this Installation Procedure, Evans can provide the “EZ-installation feature” for the ResistorPac only for Detroit Diesel Series 60 engines and most Cummins engines. For all other installations, the plug-in feature is not yet available.