



Evans Cooling Systems, Inc.
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INSTALLATION PROCEDURE FOR VOLVO D-SERIES HEAVY DUTY ENGINES

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.

1. Supplies, information, and special tools needed:

- a. Is the engine equipped with a coolant filter? If so, replace with a non-chemical coolant filter.
 - 1) **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.)
 - 2) Evans Waterless Heavy Duty Coolant (HDC). (16 gallons should suffice for a D-13.)
 - 3) two gallons of Evans Prep Fluid.
 - 3) Evans-provided labels to warn against the addition of water.
 - 4) Refractometer for measuring water content – Evans Part No. E2190.
 - d. 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.
 - e. An angled pick for difficult hoses.
 - f. 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.



Heater source and return connections

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:

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



Volvo D-13 thermostat cover

9. 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.
10. Pour about ½ gallon of Evans Prep Fluid into the top radiator hose and blow air into the top radiator hose until old coolant and Prep Fluid stops running out the bottom radiator hose.
11. 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.
12. 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.
13. Reattach any hoses and close any drains that are open, and police the hose connections one last time to assure that they are tight.
14. Fill the cooling system with Evans Heavy Duty Coolant (HDC). Any remaining Prep Fluid is compatible with Evans HDC.
15. 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.
16. 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.
17. Measuring the water content with the refractometer.
 - Calibrate the refractometer by placing a drop of new HDC on the refractometer glass and setting the reading to 57.
 - After cleaning the glass, place a drop of coolant, obtained from a location in the cooling system where the HDC is well-mixed, on the glass.
 -

The reading must be 55.7 or higher to verify that the water content is 3 percent or less (a required condition).

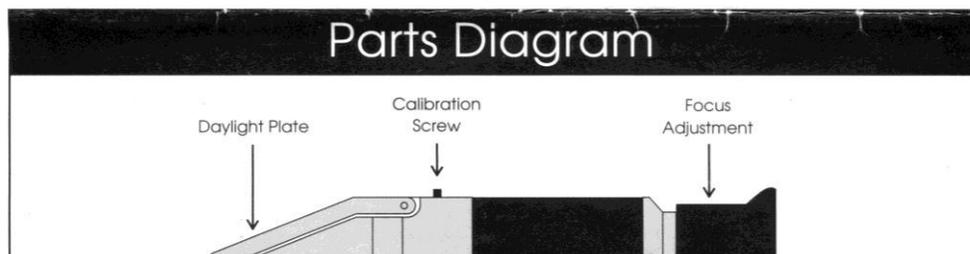
18. Place the labels to warn against the addition of water or water-based coolant.
19. The equipment is ready for use. Upon cool-down and for a couple of days, small amounts of coolant may be necessary. The expansion tank should be about 1/3 full when the engine is cold.
20. Use the same radiator cap 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.
21. Bar’s Leaks Liquid Aluminum Stop Leak is compatible with Evans HDC and is effective in stopping small leaks.

Evans Refractometer Part# E2190 for Reading Water Content of Waterless Coolant

VER 10Aug11

Hand Held Brix Refractometer

Range: 28-62°
Minimum Division: 0.2°
Dimensions: 27 x 40 160mm
Weight: 176 grams



Readings are temperature sensitive, so calibrate before use:

Calibrate the refractometer by placing a drop of **new** Evans Waterless Heavy Duty Coolant on the refractometer glass. Use the small screwdriver supplied with the instrument and set the reading to 57.0. Always clean the glass and the daylight plate with a clean, soft cloth between readings.

Place a small amount of coolant, obtained from a location in the cooling system where the coolant is well-mixed, on the glass and close the daylight plate.

<u>°Brix</u>	<u>% water</u>
57.0	0.0
56.5	1.0
56.1	2.0
55.7	3.0
55.2	4.0
54.8	5.0
54.3	6.0
53.9	7.0