EVANS®

Waterless Engine Coolants

General Installation Instructions

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Due to the variety of equipment and cooling system configurations, only generic installation procedures are provided in this document. Thoroughly review these instructions before starting your installation of Evans Waterless Coolant (EWC).

Also, at the beginning of the installation process, have on hand enough supplies of the appropriate EWC and Evans Prep Fluid to complete the project. See your owner's manual for cooling system capacity.

When converting an engine from a water-based coolant to EWC, great care should be given during the installation (conversion) process to insure that all of the old water-based coolant is removed before installing new EWC.

SPECIAL CONSIDERATIONS

WATER CONTENT: The water content of EWC after installation ideally should not exceed 3% (5% maximum). The existing water-based coolant must be completely drained from the system. It is recommended that **Evans Prep Fluid** be used to absorb and remove residual water and coolant after draining the system. Water can be used to flush the system after draining the coolant to help flush remaining coolant from the system before using the Prep Fluid.

COOLING SYSTEM CLEANERS: New EWC should not be installed into a dirty system. If the system or the drained used coolant shows signs of contamination (oily film, rust or sediment, etc.), a chemical flush should be performed. Follow the cleaner product instructions closely. The system must be thoroughly flushed with water after using the cleaner. Keep in mind that flushing with water makes residue that is 100% water (Residual 50/50 coolant is only half water) and the Prep Fluid will help to remove residual water after the fchemical flush step.

SCA's/COOLANT FILTERS: Evans waterless coolants are not intended to be used in conjunction with supplemental coolant additives (SCA) or extenders. Chemical filters used in heavy duty applications should be replaced with non-chemical filters prior to installation of EWC. **No additions of any kind should be made to the system with the exception of topping off the system with new waterless coolant.** If compromised by addition of other coolants or fluids, including water, a coolant replacement should be performed.

Because EWC tends to remove old cooling system deposits which are then trapped by the filter, the filter on higher mileage vehicles should be inspected monthly and changed as needed until they appear essentially clean.

SPECIAL EQUIPMENT

1. A high-volume air source (rather than high pressure)

If compressed air is used to help remove the old coolant and water, be aware that it can damage cooling system components. The use of high volume, low pressure air is preferred because it is safer, and in most cases, more effective. Recommended air sources include the Makita UB1103 variable speed hand-held blower and the various on-off blowers by Metro Vacuum, or a shop vac using the blower mode. A shop doing commercial installations should consider the Metro Vacuum MB 3CD Air Force Master Blaster.

2. Brix scale handheld refractometer

Testing the water content of the installed EWC requires the use of a refractometer shown in **Appendix 1**. Note that the Brix Refractometers used to measure water content are not the same as those used to determine freeze point.

SPECIAL PRECAUTIONS

WARNING: NEVER WORK ON OR REMOVE THE PRESSURE CAP FROM A HOT PRESSURIZED COOLING SYSTEM. ALLOW TO COOL COMPLETELY BEFORE STARTING COOLANT CONVERSION.

All Glycol Products Will Burn Under Certain Conditions

Evans EWC is not a “combustible liquid” according to the US Department of Transportation’s definition, but will burn above 240°F (115°C) if a flame source is present. Evans EWC and all glycol-based coolants (including those containing water), will self-ignite at approximately 725°F (385°C).

HANDLING, STORAGE, AND DISPOSAL CONSIDERATIONS

As with water-based coolants, EWC and Prep Fluid should be considered toxic. Used coolant and Prep Fluid should be collected and disposed of in accordance with federal, state, and local environmental regulations. **EWC should be tightly capped for storage and kept away from children and pets.** EWC and Prep Fluid are hygroscopic (can absorb water from the air), which is another reason to avoid leaving partially-used containers open.

INSTALLATION PROCEDURE

1. **Drain the System**:

- Remove the pressure cap (SEE WARNINGS ABOVE). Open all drain valves and plugs. Open bleeder or petcock vents if there are any.

- Drain all parts of the system, including radiator, coolant reservoir, engine block, and heater. Draining the system only from the bottom of the radiator removes less than half of the system capacity. Note: Ancillary systems in heavy duty applications that may contain coolant include APU's, fuel tank heaters, and DEF tank heaters. These sub-systems need to be drained as well.

- Use high-volume/low pressure air to **gently** blow out various parts of the system. If accessible, blow out heater circuit, blowing only in the direction from the hot coolant source (generally, the cylinder head) toward the coolant return (generally, the inlet to the coolant pump). Ensure that the heater control valve is open before applying the air.

- Block drains are frequently inaccessible, ineffective, or non-existent, and considerable amounts of coolant can remain in the block. Removal of the thermostat provides an opening to the engine where high volume air can be blown through the head and block, pushing old coolant past the coolant pump and out the bottom radiator hose or radiator drain.
- Engines having an "inlet side" thermostat and a good block drain (e.g., DD15) do not require removal of the thermostat. With the block drain open, air blown toward the engine through the top radiator hose will purge the residual coolant in the block.

- Completely empty the overflow bottle if the vehicle is equipped with one. If the system has a pressurized expansion tank, blow air into it to make sure it is empty.

2. **Purge the System**:

- Close all drain valves, plugs, and vents, and reconnect circuits. If the engine is equipped with a coolant filter (heavy duty systems), replace the filter with one that **does not** introduce coolant additives.

- Fill the system with Prep Fluid to flush parts of the cooling system suspected of harboring residual coolant or water. DO NOT use water. Vent as needed to ensure complete fill.

- Replace the pressure cap and run the engine with the heater on, at full hot, for 10 minutes after reaching operating temperature (thermostat open) to fully circulate the prep Fluid.

- Repeat the sequence given in step 1 to drain out the used Prep Fluid.

3. **Refill the System**:

- Close all drain valves, plugs and vents, and reconnect all circuits.

- Fill system completely with the appropriate EWC, and start engine. Add coolant as needed to keep system full. If system is equipped with a vented overflow bottle, leave it empty for now.

- Replace the pressure cap and run engine with the heater on, at full hot, for 10 minutes after reaching operating temperature (thermostat open) to fully circulate the EWC. Shut the engine off and allow the system to cool.

4. **Test the Coolant**:

- Draw a sample of well-circulated coolant from the radiator or pressurized overflow reservoir. Check the water content using a refractometer as outlined in **Appendix 1**. The coolant being tested must be at room temperature before testing. Caution – minimize exposure of the coolant to air during testing. If a refractometer is not available, a sample can be sent to Evans Cooling Systems for analyisis at no charge. Please call 888-990-2665 to arrange for a sample test.

- If the above procedure has been rigorously followed, the water content of the coolant should be within specification (ideally below 3 percent, or 5% maximum). If the water content exceeds this level, run the system again to operating temperature, and allow sufficient time for the thermostat to open and fluid to circulate through the radiator. Repeat sampling and water content test.

- If the water content is below 5% or less, the equipment is ready for use. Ensure the overflow bottle or expansion tank is filled to the “cold” mark with EWC. Place Evans warning stickers in strategic locations (radiator cap, radiator shroud, overflow bottle, expansion tank) to warn against adding water or water-based coolant to the system.

- Upon cool-down and for a few days thereafter, small amounts of coolant addition may be necessary. Whether the system has a pressurized

expansion tank or an overflow bottle, the coolant level should be at the cold line when the engine is cold.

MIXING COOLANTS

Waterless and water-based coolants **should not** be mixed. In the event that significant waterless coolant is lost from the system during operation and no waterless coolant is available to fill the system and reach a repair facility, water-based coolant or water may be used. However, repairs should be made as soon as possible, and the system should be drained, purged and re-filled with new waterless coolant.

STOP LEAK USE

Leaks should be repaired. Stop-leak type products are not intended to be permanent repairs. However, they may be used as a temporary measure. Carefully follow the instructions on the stop leak product label. Overuse may clog radiator and heater core passageways.

High Performance Cooling System Suggestions

Cooling system auxiliary circuits and accessories

Oil coolers, fans, intercoolers, thermostats and pullies.

1. Air to liquid oil coolers are preferred when maximum engine cooling system efficiency is required.
2. When using liquid to liquid oil coolers the design with the least engine coolant restriction should be used. The oil cooler capacity might have to be increased to lessen the engine coolant restriction.
3. Electric Fans are compatible with Evans Waterless High Performance Coolant. Proper fan sizing is important to maintain normal operating temperature.
4. Mechanical fans are compatible with Evans Waterless High Performance Coolant. Use of the proper pump drive ratio will improve the fans efficiency. Flex fans for racing typically do not work well in street applications.
5. Intercoolers, charge air coolers and chillers all have an effect on the cooling system in one way or another.
6. Front mount air to air intercoolers/charge air coolers restrict the air to the radiator, relocate or size accordingly.
7. Liquid to liquid intercoolers and liquid to air chillers plumbed into the engine cooling system add heat load, size the radiator accordingly or use separate cooling system.

8. Due to unlimited number of OEM designs of thermostats there is not a high flow option for all applications. If available the high flow version is preferred for Evans Waterless High Performance Coolant.
9. Removal of the thermostat is possible in certain applications due to the boiling point of Evans Waterless High Performance Coolant. When removing the thermostat the thermostat bypass MUST be plugged or eliminated.
10. The relationship of the pump pulley to the crankshaft pulley determines the pump drive ratio. This ratio also affects the mechanical fan speed. Pump drive ratios higher than usual are possible with Evans Waterless High Performance Coolant.
11. Pump and fan drive ratios are engine RPM specific and MUST be taken into consideration for each application.

IMPORTANT INFORMATION BEFORE INSTALLING EVANS WATERLESS COOLANT

Some cooling systems are designed for 100% water and have components that are too flow restrictive for Evans Waterless High Performance Coolant to maintain the normal operating temperature.

Engine operating temperatures up to and including 260F/127C can be safe when using Evans High Performance Coolant, but only if engine oil temperatures are controlled within normal ranges.

Components that fall into the above include:

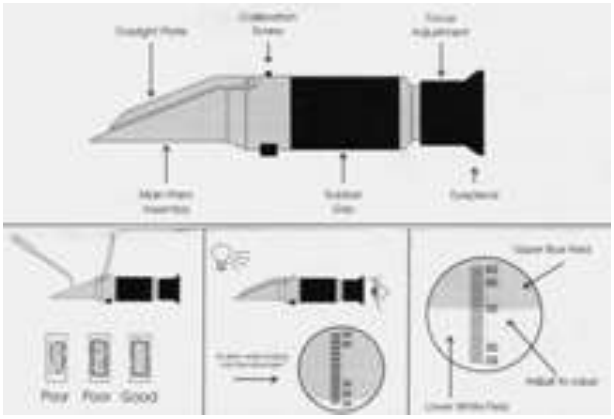
Small tube copper brass radiators
Double or triple pass radiators aluminum or copper brass
Dimple tube radiator cores
Restrictor washers smaller than the OEM thermostat
Lines or hoses smaller than the OEM thermostat
Some electric pumps, remote or engine mounted.
Pump drive ratios of less than 70% of crank speed.

APPENDIX 1

DETERMINING WATER CONTENT OF A WATERLESS COOLANT

BRIX HAND-HELD ANALOG REFRACTOMETER USE INSTRUCTIONS

Evans Part No. E2190



General Considerations

- Readings are temperature sensitive, so calibration must be performed before each session.
- Before every reading, wipe the glass with a paper towel.
- Use a glass or metal rod to transfer coolant specimen. Wipe it off between measurements.
- Conduct measurements immediately. Ambient humidity can affect measurements.
- Repeat measurements until readings are consistent.

Directions

Calibrate the Refractometer:

a. Wipe the glass and daylight plate clean with paper towel.
b. Place 2-3 drops of virgin Evans Waterless Coolant on the refractometer glass.
c. Aim refractometer toward bright light and adjust focus.
d. Use the small screwdriver supplied with the instrument and set the reading to 57.0.

Take the Reading:

a. Wipe the glass and daylight plate clean with paper towel.
b. Place 2-3 drops of coolant, obtained from a location in the cooling system where the coolant is well-circulated, onto the glass and close the daylight plate.
c. Measure the water content with the refractometer. The reading must be 55.7 or higher to confirm the water content is 3 percent or less (a required condition).

^{0}Brix	% Water
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