

TECHNICAL BULLETIN

TB NO. 1032

Rev. 0

SUBJECT: Superior Engine Water Cooling Systems

PROBLEM: Poor venting and water system piping can lead to high air intake manifold temperatures which leads to higher temperature exposure to the power cylinder head and possible detonation.

SOLUTION: Superior naturally aspirated and turbocharged engines have a closed loop system(s) for cooling as opposed to open systems (using continuous make-up water at the inlet with dumping at the outlet) which are not recommended. System piping should be directly routed to enhance flow from engine/turbo to cooler. Note that the system(s) are always completely filled, use water/anti-freeze mix or equal (including scale and rust inhibitors), and eliminate all possible air entrainment. **EnDyn** also recommends a regular testing program for coolant content and replacement.

System Venting. Particular attention should be paid to the venting system. Each system (jacket water and intercooler) should be separate and completely independent of the other with both utilizing constant open and properly sized vent lines (1/4" pipe to 3/8" O.D. tube) to **separate** surge or expansion tanks (see attached sketch). Note that inadequate tube sizing (large or small) can result in poor venting via plugged lines or excess flow by-passing the radiator.

Generally, vent lines are recommended at the highest point of the thermostat housing, radiator/cooler sections, discharge water pump housing(s), and intercooler(s). All vent lines, including multiple vent lines connected or manifolded within a system, should be installed with a continuous upward slope to enter the surge tank from the bottom.

Surge Tank. The surge or expansion tank(s) allows the cooling system to thermally expand or contract while acting as a low level supply/reservoir without air entrainment. Tanks vary in size because design constraints factor around 2-3 times the total system thermal expansion. This is accomplished by installing the tank(s) at the highest elevation of the system. **Note:** for installations utilizing remote radiators, a separate surge tank should be mounted at least two (2) feet higher than the system's highest point.

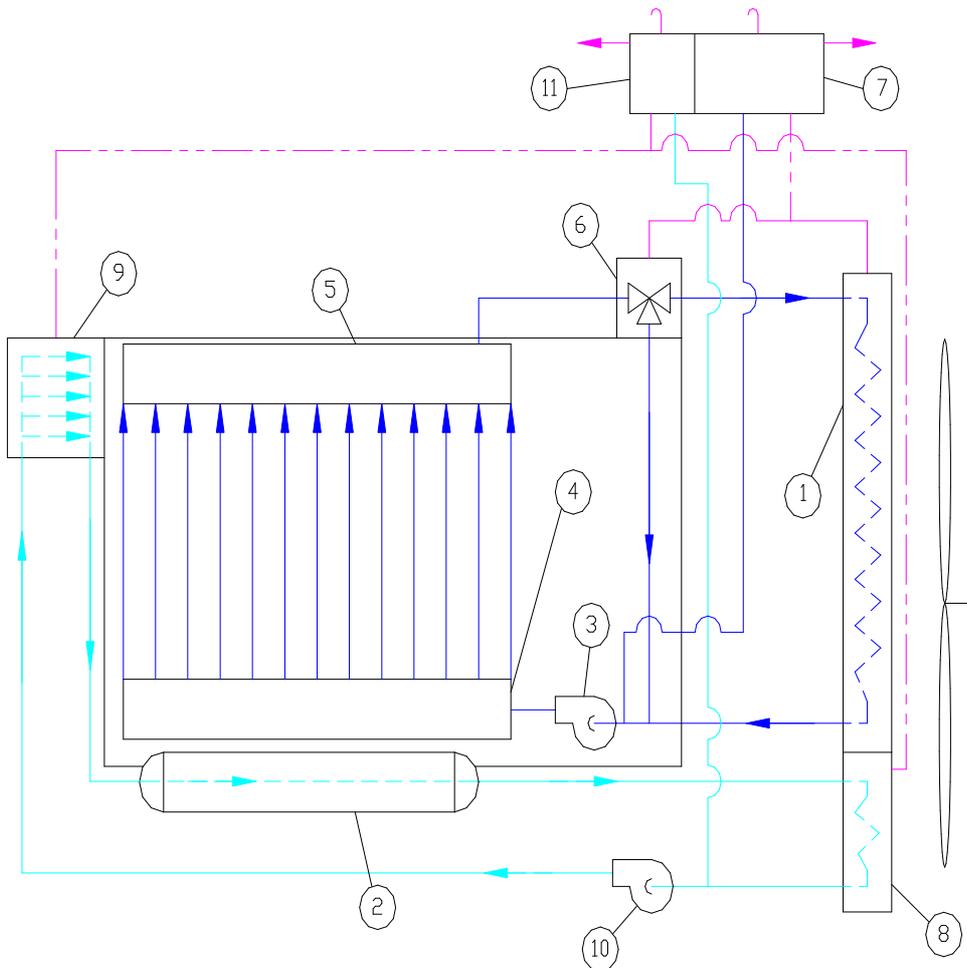
Surge tanks are typically open or vented to atmosphere at the top with the return lines (3-4 times total vent flow area with min. 1-1/4" pipe) running directly from the tank bottom to the pump inlet lines. Again, it is good practice to use a direct route from the tank to pump inlet to provide adequate flow while preventing pressure loss. The make-up line should be connected as close as possible to the inlet of the pump.

In some locations, **EnDyn** has noted that units are equipped with a common surge tank with a common make-up line for both jacket water and intercooler systems. This set-up can act as a disadvantage in that the common open vent from the jacket water system will increase the tank water temperature. If the intercooler system requires make-up water from the surge tank, this elevated temperature (which is greater than the normal water temperature from the radiator) can result in high intake manifold temperatures.

Water Fill and Drain. In order to prevent air pockets from forming, the fill line and drain are installed at the lowest elevation of the water system.

For further information or questions concerning Superior engine cooling water systems, please contact **EnDyn's** Technical Department or your local **EnDyn PowerParts®** Distributor.

ENGINE COOLING SYSTEM



1. Jacket Water Radiator
2. Lube Oil Cooler (Thermostatic by-pass not shown)
3. Jacket Water Pump
4. Jacket Water Inlet Manifold
5. Exhaust Manifold
6. Thermostat Housing
7. Jacket Water Surge/Expansion Tank
8. Intercooler Water Radiator
9. Intercooler
10. Intercooler Water Pump
11. Intercooler Water Surge/Expansion Tank