

## Subject: Troubleshooting Vehicles Equipped with Viscous Fan Drives



**Qualify by assuming the vehicle to be in OEM condition.**

### **A. Overheating constantly, in traffic and on long pulls**

1. Check the coolant level.
2. Check the gauge for proper operation (especially electric gauges).
3. Check for closed winterfront.
4. Check thermostat for proper operation.
5. Check belts for proper operation (affects water pump and fan efficiency).
6. Check exterior of radiator for obstruction.
7. Check fuel pump for proper fuel delivery (obstructed return).
8. Check turbo for proper application and parts.
9. Check for manifold pressure leak.
10. Check interior of radiator core for obstructions or plating.

### **B. Overheats only on long pulls in high ambient temperature**

1. Check coolant level.
2. Check gauge for proper operation (especially electric gauges).
3. Check thermostat for proper operation.
4. Check belts for proper tension (affects water pump and fan efficiency).
5. Check exterior of radiator for obstruction.
6. Check fuel pump setting for proper fuel delivery (obstructed return).
7. Check turbo for proper application and parts.
8. Check for manifold pressure leak.
9. Check for restriction in exhaust.
10. Check for proper fan clutch and fan combination as well as application.
11. Check for proper fan clutch operation (cardboard test).
  - a. Must be at least 70-75 degrees F. ambient temperature
  - b. Fan clutch should engage at approximately 190-195 degrees F. coolant temperature
  - c. Fan speed should be at least 85% of pulley speed after engagement
  - d. If checked on dyno ambient temperature should be at least 65-70 degrees F. and DO NOT RUN THE VEHICLE UNTIL IT OVERHEATS.
  - e. Due to lack of good airflow in dyno rooms even a good unit will overheat if subjected to in excess of 95 degrees ambient temperature.
  - f. Lack of fan clutch engagement does not positively indicate a malfunctioning fan clutch – Lack of engagement can also be due to problems with the radiator core as in insufficient heat rejection for the fan clutch to engage.
  - g. If a replacement of the fan clutch does not result in an improvement then the fan clutch was not the source of the problem
  - h. If item “g” above occurs then check the interior of the radiator core obstructions and/or plating (silicate dropout) which will insulate the core and decrease the core’s ability to reject heat.

**C. If vehicle is more than 3-4 year old and overheating in addition to items outlined under item "B" above**

1. Check if the vehicle radiator was recored recently and if recore was the same construction, fin count and number of rows of tubes as the original.
2. Fins per inch and number of rows of tubes must remain the same or increase. Neither should decrease at the expense of increasing the other.
3. Changing the construction from serpentine to plate and fin will decrease the cooling capacity of the radiator and can cause the fan clutch to engage later than desired.

**D. Overcooling at operating speed**

1. Check the accuracy of the gauge.
2. Normally a lack of coolant flow control
  - a. Thermostat not closing
  - b. Leakage in top tank baffling
  - c. Improper radiator plumbing

**E. Overcooling while parked**

1. Check the accuracy of the gauge.
2. Idling for more than 15 minutes is not recommended.
3. Some engine manufacturers advise that an engine idling at 1200 RPM will only maintain a water temperature of 100 degrees F. over the ambient temperature (i.e. e. 20 degrees F. outside temperature will result in a 120 degrees F. water temperature.)
4. Diesel engines should not be operated with less than 140 degrees F. water temperature.
5. Coolant flow control is more important to parked vehicles than those operating on the road.
6. Driver discomfort is very difficult to correct due to lack of accurate measurement and individual assessments.
7. Most vehicle manufacturers require special packages for vehicles that the driver intends to sleep in overnight in cold climates.

**Summary**

Make sure there really is a problem and the extent of the problem is known.

- A properly operating cooling system should maintain the coolant temperature to within 5-7 degrees F. of the thermostat opening temperature in flat terrain.
- Fan clutch engagement is not required until the vehicle is under a load for some 7-10 minutes in 70+ degrees F. ambient temperature

Begin a systematic examination of the vehicle checking each component that could contribute to the problem until the cause(s) are located.

- Do not overlook any possibility.



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