Glossary of Engine Cooling System Terms — SAE J1004

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Report of Engine Committee approved February 1975.

PREFACE–The objective of this glossary is to establish uniform definitions of parts and terminology for engine cooling systems.

1. Aeration–The entrainment of gas (air and/or combustion gas) in the coolant.

2. Afterboil–Boiling of the coolant after engine shutdown caused by residual heat in the engine.

3. Afterboil Volume–The quantity of coolant forced from the engine by afterboil. This may or may not be displaced from the system depending upon the system design and/or coolant level.

4. Air-to-Boil Temperature–The ambient temperature at which the coolant at the radiator inlet reaches its boiling point. The coolant boiling point is a function of the absolute pressure and the characteristics of the coolant. However, the term is also quite commonly used without consideration for the absolute pressure or the coolant characteristics. In this case, an open radiator at sea level pressure with water, boiling point 212°F (100° C), as the coolant is assumed. The Air-to-Boil Temperature is computed as follows: Boiling temperature (or design temperature, which may be less than the boiling temperature) of the system coolant minus the highest coolant temperature plus ambient temperature.

5. Air Recirculation–Fan–The recycling of air already discharged by the fan.

6. Air Recirculation–Radiator–The recycling of hot air already passed through the radiator, usually caused by engine enclosure pressure.

7. Ambient Temperature–The environmental air temperature in which a unit is operating. In general, the temperature is measured in the shade (no solar radiation) and represents the air temperature for engine cooling performance measurement purposes. Air entering the radiator may or may not be the same as ambient, due to possible heating from other sources or recirculation.

8. Auxiliary Tank–A separate tank in the cooling system provided to perform one or more of the following functions: (1) filling, (2) coolant reservoir, (3) de-aeration, (4) retention of coolant expelled from radiator by expansion and/or afterboil, and (5) visible fluid level indication.

9. Blocked Open Thermostat–A normal thermostat mechanically blocked open to the position representing its maximum open position; usually used during cooling tests.

10. Blower Fan–A fan positioned in a cooling system such that the air passes through the fan before entering the radiator.

11. Coolant–A liquid used to transport heat from one point to another.

12. Cooling Differential (Inlet Temperature Differential)–The temperature differential existing between the ambient air temperature and the coolant temperature at the radiator inlet.

13. Cooling System–A group of inter-related components to effect the transfer of heat.

14. Cooling System Capacity (Volume)–The amount of coolant designated in quarts (litres) to completely fill a cooling system to its designated cold level mark.

15. De-aeration–The removal or purging of gases (air and/or combustion gas) which have been entrained in the coolant.

16. De-aeration Capability–The ability of the cooling system to de-aerate the coolant expressed in terms of time and/or performance under specified test procedures.

17. De-aerating Tank–A specially designed tank capable of removing entrained air and/or combustion gas from the circulating coolant.

18. Drawdown–The quantity of coolant which can be lost before impairing the cooling system performance under normal operating conditions.

19. Expansion Volume–The volume of space in a cooling system (such as in the radiator top tank or auxiliary tank) which allows for the expansion of coolant resulting from temperature rise.

20. Fan Air Flow–The rate of air flow usually in units of cubic feet (cubic metres) per minute that a fan can deliver at standard air conditions, and a specified static pressure and speed.

21. Fan Drive-Temperature Controlled–A fan drive which can be turned on or off or whose speed can be modulated in accord with temperature conditions of either the coolant or the circulated air. The purpose of the drive is to operate the fan as required for cooling, but when cooling demands permit, allows the fan speed to be reduced or the fan to freewheel to reduce fan horsepower and/or fan noise. The clutch may be any of the following type: (1) Dry Clutch, (2) Wet Clutch, (3) Viscous Shear Coupling, or (4) Dump and Fill.

22. Fan Drive-Torque Limiting–A drive, usually of a viscous shear type, not controlled directly by coolant or air temperature, which is used to limit maximum fan speed and power absorption.

23. Fill Rate–The coolant flow rate usually in gallons (litres) per minute that an empty cooling system will accept up to the full mark without overflowing.

24. Flow Rate, Coolant–The rate of flow of coolant through a cooling system component or group of components under specified conditions in gallons (litres) per minute.

25. Grade Cooling Level–The cooling differential or air-to-boil value obtained while maintaining a specified speed of ascent on a particular percent and length grade.

26. Heat Dissipation–The quantity of heat, usually expressed in British thermal units per minute (kilowatts), that a heat transfer component can dissipate under specified conditions.

27. Idle Time to Boil–The time required to boil the coolant while idling following other specified conditions.

28. Inlet Tank Temperature–The temperature of coolant entering the radiator inlet.

29. Open Radiator Tank–A radiator tank that is open to atmospheric pressure.

30. Outlet Tank Temperature–The temperature of the coolant leaving the radiator outlet (this would include any temperature gain or loss from any device located in the radiator outlet tank).

31. Overflow Bottle–See "Auxiliary Tank."

32. Overheating–An operating condition where coolant temperature exceeds design intent. This may be caused by a deficiency in the cooling system or by abnormal operating conditions.

33. Pump Cavitation–The formation of gas and/or vapor bubbles which reduce the pump delivery.

34. Pump Cavitation Pressure–The pressure on the coolant existing at the point where a specified degree of cavitation occurs under defined temperature conditions.

35. Pump Cavitation Temperature–Temperature of coolant at the point where a specified degree of cavitation occurs under defined pressure conditions.

36. Radiator Air Restriction–The air pressure drop, usually expressed in inches (millimetres) of water, across a radiator at a specified rate of air flow and air density.

37. Radiator Air Baffle–Various types of barriers used to enclose or direct air through the radiator to minimize air recirculation.

38. Radiator Cooling Potential–The temperature differential between the air temperature entering the radiator and the average temperature of coolant in the radiator, usually under stabilized conditions.

39. Radiator Shutters–Automatic or manually operated devices positioned in front or rear of radiators to control engine coolant temperatures by regulating air flow thru the radiators.

40. Ram Air Flow–The amount of air passing through the radiator as a result of vehicle motion or wind.

41. Specific Heat Rejection–The heat rejection of the engine expressed essentially in British thermal units per minute (kilowatts) per brake horsepower (kilowatts). It should be further qualified by engine load, speed and ambient air temperature.

42. Stabilization–A condition attained during specified conditions of engine operation when the temperatures of air, oil, and coolant have reached values which will not change regardless of the length of time the unit is run.

43. Standard Air–Air at 70°F (21.1°C) and 29.921 in (760 m) of mercury and weighing 0.07488 lb per ft^3 (1.200 kg per m^3).

44. Suction Fan–A fan positioned in a cooling system so that air passes through the radiator before entering the fan.