

DIRECTORATE GENERAL BORDER ROADS
GENERAL MAINTENANCE INSTRUCTION NO 190

ON

SCALE FORMATION IN COOLING SYSTEM AND ITS PREVENTION

1. INTRODUCTION

1.1. It has been observed that adequate attention is often not given to the cooling system, as a result, excessive scale formation takes place in the water passage in cylinder block, cylinder head and radiator, which adversely affects the engine performance.

1.2. A guide line is given in this GMI for cleaning the cooling system for preventing rust formation.

2. CLEANING OF COOLING SYSTEM

2.1 Allow the engine to cool down if it is hot.

2.2. Remove radiator cap and drain the coolant from entire cooling system by opening both radiator and cylinder block drain plugs.

2.3. Close the drain plugs.

2.4. Fill the radiator with clean water well below the overflow pipe (quantity equal to half the cooling system capacity).

3. IF HP RADIATOR CLEANER IS USED

3.1. Pour into radiator 0.5 litres of HP Radiator cleaner and top up the cooling system with clean water to full level.

3.2. Do not close radiator cap.

3.3. Start and run the engine for 30 minutes at full speed. Ensure that cooling system temperature **DOES NOT CROSS 90°C.**

4. IF COMMON WASHING SODA IS USED

4.1. Add about 1.2 kgs of common washing soda into cooling system through radiator filler neck and top up the cooling system with clean water to full level.

4.2 Drive the vehicle for one day with this solution.

5. Drain the cooling system by opening both the radiator and cylinder block drain plugs.

6. Remove the hose connection thermostat to upper water cooling line and remove engine block drain plugs.

7. With suitable adaptor, connect water supply line to upper cooling line.

8. Slowly increase water supply and continue water flow till the outlet water from cylinder block drain plug location is visually clean and free of sediments.

9. Remove water supply connections. Fit cylinder block drain plugs.

10. Remove hose connecting radiator bottom tank to water pump and close the radiator drain plug.

11. Continuously pour fresh water through radiator cap. Stop supply of water when the outlet from the radiator bottom tank is visually clean and free of sediments.

12. In order to thoroughly clean the radiator fins from foreign bodies, compressed air should be blown or water flushed through radiator core from the engine side.
13. Remove the thermostat, clean it thoroughly and check for proper functioning. Replace if necessary. For optimum engine performance and life, it is essential that thermostat is fitted in the cooling system. If thermostat is functioning properly, the engine reaches the operating temperature very soon after starting and thereafter, it stabilizes within the operating range. The operating range of temperature for the cooling water is 75° - 95°C.
14. Make all hose connections from radiator to cylinder block. Replaced damaged/Soft rubber hoses, tighten hose clamps to ensure leak proof joints.
15. Fill the cooling system with clean and portable water blended with anti-corrosive oil. Add 60 cc of the recommended anti-corrosive oil for entire cooling system and when topping up the water, add 5 cc per liter of water. The following anti- corrosive oils are recommended:-
 - 15.1 Bharat Sherol B (M/s Bharat Petroleum)
 - 15.2. Gulf Emusil NA (M/s Pertocil)
 - 15.3. HP Radiator Protector (M/s Hindustan Petroleum)
 - 15.4. Castrol Cooledge SL (M/s Indrol)
 - 15.5. Veedol Amulcut 4 (M/s Tide Water)
 - 15.6. Servocut S (M/s Indian Oil Corporation)
 - 15.7 Aqua Clear Enginex
16. Start the engine and check for leakage, if any.
17. Ensure that radiator cap is genuine. A proper radiator cap maintains pressure in the cooling system and makes the engine more efficient by permitting a slightly higher operating temperature. A second valve in the radiator cap prevents for formation of vacuum in the system.
18. The cleaning and degreasing of cooling system should be carried out at every 36,000 kms or earlier, depending upon the site condition or as per instructions issued by CE's.

CONCLUSION

19. Proper care and maintenance of cooling system will go long way in achieving optimum engine performance and life.

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