

DIRECTORATE GENERAL BORDER ROADS
E4 TECH
GENERAL MAINTENANCE INSTRUCTIONS NO. 174
ON
COMPARISON BETWEEN KIRLOSKAR AIR COOLED
AND WATER COOLED ENGINES

1. **AIM**

The aim of this instruction is to give comparison between Kirloskar air- cooled and water cooled engines for information of units / workshops

2. **DETAILS**

Details of comparison are given as per Appendix 'A' to this instruction.

AIR COOLING VERSUS WATER COOLING

Appex 'A' to GMI-174

S/No	Nomenclature	Air Cooled Engines	Water Cooled Engines
1	2	3	4
1.	Cooling System	(a) Direct engine cooling through ambient air.	(a) Engine cooling through water.
		(b) No cooling water required.	(b) Cooling water is required.
		(c) No freezing.	(c) Anti freezing mixture at zero & sub zero temperature.
		(d) No sealing elements.	(d) Water sealing element required.
		(e) No water hoses, no hose clips.	(e) Water hose and clips required.
		(f) No radiator.	(f) Radiator is required.
		(g) No water pump.	(g) Water pump is required.
		(h) No damage through corrosion.	(h) Changes of damages through corrosion.
		(j) Less break downs due to cooling system.	(j) More than 40% of all water cooled engines break down are due to defective cooling system.
2.	Engine Operation Starting	(a) Down to minus 15 ⁰ C no starting aid.	(a) Pre heater is required.
		(b) Down to minus 25 ⁰ C, starting aid such as flame type pre heater required.	(b) Pre heater is required.
3.	Working temperature	(a) Air Cooled engines exceed the dew point limit shortly after starting.	(a) It takes more time.

		(b) The cooling surface temperature of the air cooled engine, which is higher by about 70° C guarantees contrary to the water cooled engine on absolutely satisfactory full load operation in extremely hot climate without any need for additional equipment.	(b) Water cooled engines need at least twice as long to leave the wear prompting low temperature ranges due to their far greater masses to be warmed up. Cold cylinders liners causes the sulphur oxide released during combustion to mix with condensed water and form sulphuric acid with a strongly corrosive effects.
4.	Environmental Influences Dust	(a) The high velocity cooling air on air cooled engines prevent the formation of dust deposited which could impair the cooling efficiency. The cooling air cowling employed and the finning arrangement of cylinders & cylinder heads pre clude the creation of air bags & thus the formation of dust deposits .	(a) In dusty atmosphere radiator of water cooled engines are liable to clogging dust.
5	Climate	(a) Due to the cooling surface temperature of the air cooled engines which is about 70° C higher than that of water cooled engines, the temperature difference relative to the cooling medium fluctuates less at changing out side temperature i.e. the amount of heat dissipated during changing ambient temperature is more stable than in water cooled engines.	(a) Water cooling system can cope with temperature extremes only with large dimensioned radiators and that only to a limited extent , in less course one puts up with a latter is normally not acceptable, expensive and heavy installation are inevitable.

