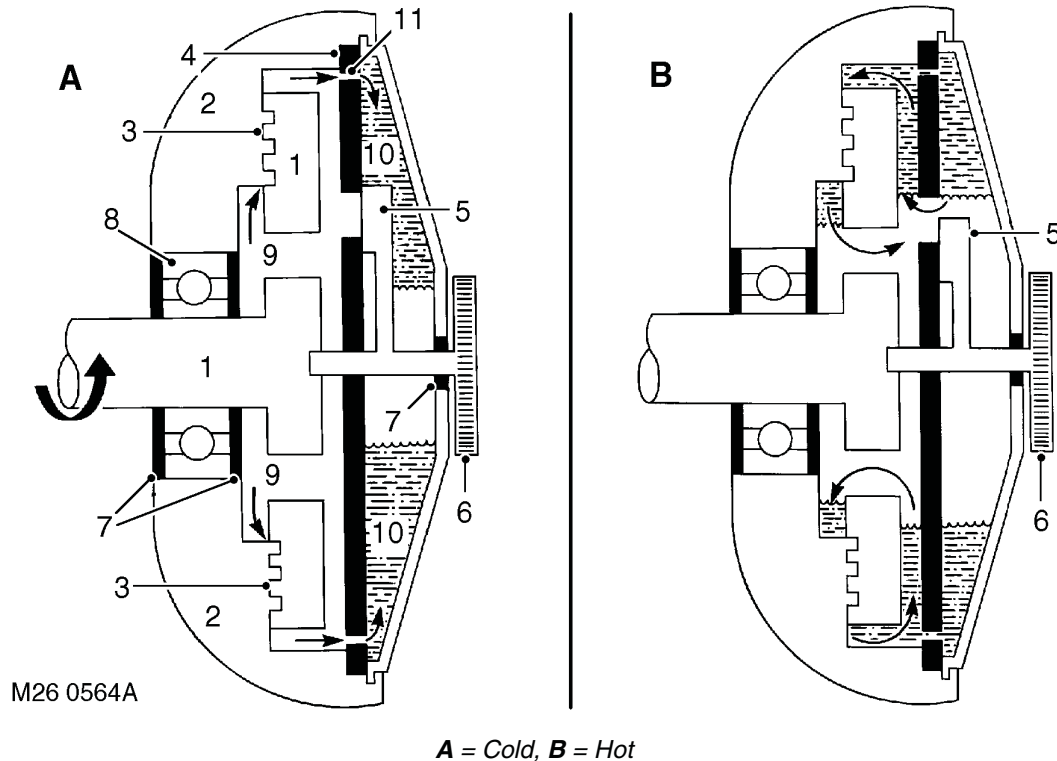




## Viscous fan operation



- 1 Drive plate
- 2 Fan body
- 3 Clearance
- 4 Valve plate
- 5 Valve
- 6 Bi-metallic coil

- 7 Fluid seals
- 8 Ball race
- 9 Fluid chamber
- 10 Reservoir
- 11 Return port

When the engine is off and the fan is not rotating, the silicone fluid stabilises within the fluid chamber and the reservoir. The fluid levels equalise due to the return port in the valve plate being open between the fluid chamber and the reservoir. In this condition, when the engine is started, silicone fluid is present in the fluid chamber and causes drag to occur between the drive plate and the body. This causes the fan to operate initially when the engine is started.

As the fan speed increases, centrifugal force and a scoop formed on the fluid chamber side of the valve plate, pushes the silicone fluid through the return port in the valve plate into the reservoir. As the fluid chamber empties, the drag between the drive plate and body is reduced, causing the drive plate to slip. This reduces the rotational speed of the fan and allows it to 'freewheel'.

When the coolant temperature is low, the heat emitted from the radiator does not affect the bi-metallic coil. The valve remains closed, preventing fluid escaping from the reservoir into the fluid chamber. In this condition the fan will 'freewheel' at a slow speed.

As the coolant temperature increases, the heat emitted from the radiator causes the bi-metallic coil to tighten. This movement of the coil moves the valve to which it is attached. The rotation of the valve exposes ports in the valve plate which allow silicone fluid to spill into the fluid chamber. As the fluid flows into the clearance between the annular grooves in the drive plate and body, drag is created between the two components. The drag is due to the viscosity and shear qualities of the silicone fluid and cause the drive plate to rotate the body and fan blades.

As the coolant temperature decreases, the bi-metallic coil expands, rotating the valve and closing off the ports in the valve plate. When the valve is closed, centrifugal force pushes silicone fluid through the return port, emptying the fluid chamber. As the fluid chamber empties, the drag between the drive plate and the body is reduced and the body slips on the drive plate, slowing the rotational speed of the fan.