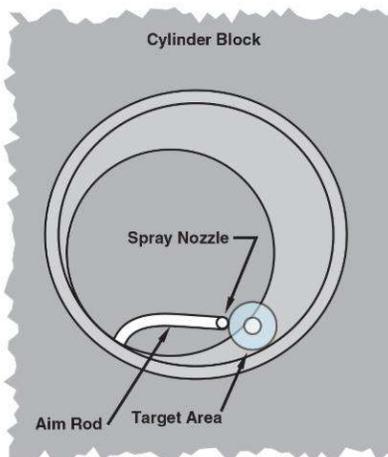


Steel Piston Oil Coolant Nozzle

PISTON COOLING NOZZLES/JETS



**Typical location of
piston cooling nozzle
in the cylinder block
(view from the bottom)**



In ALL diesel engines, the piston cooling nozzle or jet, plays an important job in the engine by using engine oil to cool the piston

and prevent it from overheating.

In the combustion chamber, combustion heat causes very high temperatures throughout the cylinder and at the piston crown (sometimes reaching over 932°F/500°C for steel pistons). By injecting engine oil onto the pistons from below, the oil spray dissipates the accumulated heat.

Depending on the engine type and output, most diesel engines usually have one nozzle per cylinder.

The most common problem with piston cooling nozzles or spray jets are misalignment and restricted oil passages. Nozzles that are made out of metal, are easily bent or fractured from contact by the cylinder component assemblies, while nozzles that are made of plastic, can be cracked or broken completely.

Once the cylinder components are installed, the piston nozzles or jets can be checked for proper alignment. Failure to follow this procedure will result in higher piston crown

temperatures, which will directly affect the piston skirt area. Any increase in piston skirt temperature will expand the diameter above the allowable tolerances thereby eliminating the piston-to-liner clearances, resulting in piston seizure.

TIPS FOR ENGINE REPAIR/REBUILDING

- All piston cooling nozzles should be removed before fitting or removing the pistons, connecting rods or cylinder liners.
- It's very important to make sure the cooling nozzles are properly aligned and in good working order when being installed - gasket residue and deposits may clog the nozzles and should therefore always be thoroughly cleaned or replaced when removed.
- Make sure the pistons/skirts are installed with the clearance notch in the correct direction to clear the piston cooling nozzle.
- If the piston cooling nozzles are damaged, the piston crown will not be cooled-or insufficiently cooled-during operation after the repair.
- Not following these tips, can lead to the worst-case scenario which is overheating of the piston and cylinder, resulting in serious engine damage!
- Failure to observe the oil change interval may result in damage to the cooling oil nozzle.

Another thing to consider is that the piston cooling nozzles or jets also lubricate and cool the wrist pins which allow the piston to move freely on the connecting rod.

COMMON PISTON FAILURES AND THEIR CAUSES

Piston Crown Scuffing

(note all of these can be caused by a piston cooling nozzle or jet issue)

Piston scuffing

Piston scuffing occurs due to the piston rapidly exceeding normal operating temperatures.

In some applications, lack of oil cooling the piston crown can cause rapid piston crown expansion, resulting in the loss of piston/skirt-to-cylinder liner clearance, creating scuffing and possible seizure.

Probable Causes

- Over-fueling of specific cylinder
- Lack of fresh air to that cylinder
- Exhaust restriction
- Engine or injection timing
- Lack of piston crown cooling

Piston Crown Burning

Piston top erosion is commonly known as "Piston Burning" and is normally a result of an improper air/fuel ratio balance however, lack of cooling can also cause this.

Probable Causes

- - Improper injection timing
 - Injector contamination
 - Piston Cooling Nozzle failure
 - Lack of fresh air supply
 - Exhaust restriction
 - Excessive use of ether

Piston Skirt Scuffing

It is important to maintain minimum piston skirt temperatures. If excessive heat is allowed to build up and move down to the skirt area, thermal expansion will result in the loss of piston/skirt-to-cylinder liner clearance, creating scuffing.

Probable Causes

- - Overheating of coolant system
 - Lack of heat transfer in cylinder
 - Lack of piston crown cooling

Consult the OE manufacturer's service information for the correct location and area that the piston cooling nozzle or jet needs to be directed at the underside of the piston to achieve maximum piston cooling. Each engine manufacturer has specific targets for the piston cooling nozzles or jets and must be set correctly for that particular engine.

AFA Industries has a complete offering of engine parts for a variety of other Cummins® engines to rebuild or repair most everything on the engine. Also available are Cylinder Components, Valve Train parts, Water Pumps, Cooling System Components, Fuel System Components, In-Frame and Complete Overhaul Kits, and other engine parts to help you repair most components for the ISB/QSB Series engines as well as most all Cummins engines available.

Consult your OE reference materials for exact applications.
Refer to the OEM service manual for proper engine assembly procedures.
Contact your local sales representative or AFA Certified Distributor for more information.

