

TECBLOG **COOLANT HOLE SIZE**

OVERHEATING – IT'S A MAJOR CONCERN FOR MANY AFTER REBUILDING OR REPAIRING AN ENGINE, ESPECIALLY IF AN OVERHEAT WAS THE REASON IT HAD TO BE REPAIRED IN THE FIRST PLACE.

TRENDING NOW

A popular topic on the Fel-Pro® Technical Forum is the relationship between overheating and the size and/or position of coolant holes in our head gaskets:

"I'm concerned that the coolant holes in the gasket are way smaller and not the right shape compared to the block."

"...I noticed that the water jacket holes in the head gasket did not match those in the block and head."

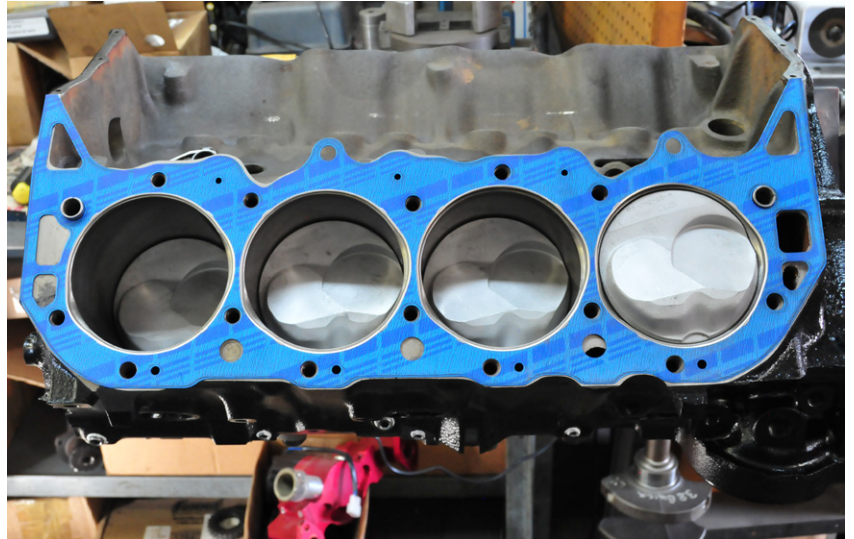
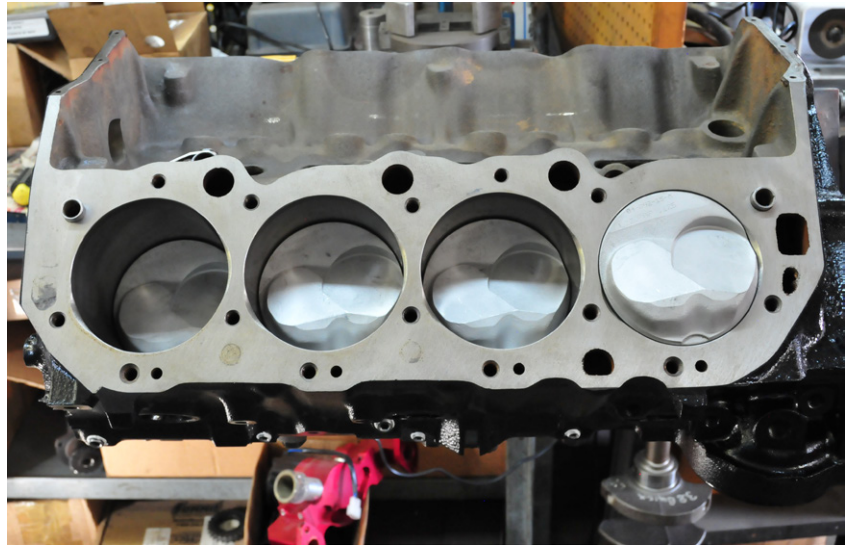
"Why are the water jackets restricted on the gaskets & can they be drilled out?"

"...the holes seem pretty small in the gaskets and some holes in the gasket are only half open on the head side. Should I open up the gasket holes to max the flow or are they this small for a reason?"

REGULATING TEMPERATURE

Controlling the temperature of an engine is critical for longevity and drivability. Overheating can lead to gasket failure, casting warpage and severe engine damage. At the same time, an engine that runs too cool will experience lower fuel economy, increased emissions and wear more quickly. The temperature an engine runs at needs to be properly regulated. The thermostat, radiator, and coolant play a big role in this – but they aren't alone! Head gaskets are engineered with precisely shaped and sized holes to meter the flow of coolant through the engine.

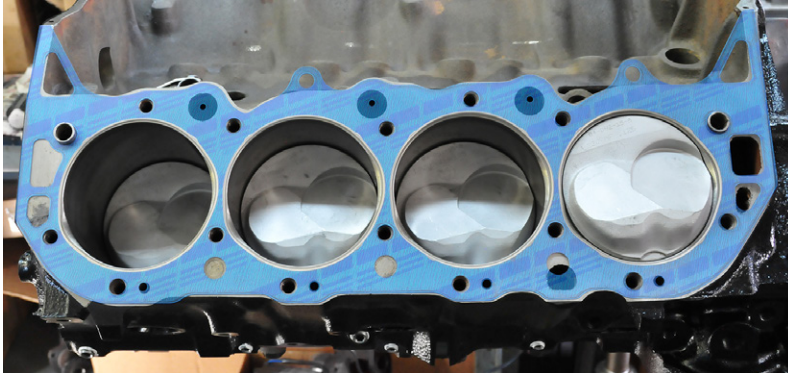
LET'S TAKE A LOOK AT A BIG BLOCK CHEVY AS AN EXAMPLE – ON THE TOP, WE HAVE A BARE CASTING, ON THE BOTTOM, A FEL-PRO® HEAD GASKET IS INSTALLED:



THE COOLANT HOLES IN THE BLOCK CASTING ARE MUCH LARGER THAN THOSE IN THE FEL-PRO HEAD GASKET – THIS IS BY DESIGN!

CONTINUED...

TO BETTER VISUALIZE HOW MUCH THE COOLANT HOLES REALLY CONTROL THE FLOW OF COOLANT, WE'VE SUPERIMPOSED THE GASKET ON THE BLOCK:



Aside from the reduction in size of the top coolant holes, the large coolant hole on the bottom right is partially blocked off. There are also holes in the gasket which are not open in the block. Some Big Block Chevy engines have these holes while others do not. This will depend on the generation, application and the intended use of the block. These are not design flaws or oversights – the size and placement of every hole in the gasket is intentional, and this is true for every gasket we manufacture.

WHAT IS THE PURPOSE OF USING SMALLER HOLES IN THE HEAD GASKET OR BLOCKING OFF HOLES IN THE BLOCK?

The holes in the head gaskets are there to meter the flow of coolant properly through the heads. In most engines, coolant flows from the water pump at the front of the engine block toward the rear, goes up into the head(s), to the thermostat and finally to the radiator once the thermostat opens before returning back to the water pump.

An improperly sized or placed hole can create a “shortcut” which prevents coolant from following the correct “path” through the engine. If the coolant takes a “shortcut” because a coolant hole is too large at the front of the engine, the rear cylinders can overheat. If the holes are properly placed, but too large, the coolant can pass through the engine too quickly and fail to absorb enough heat, also resulting in overheating.

SO WHY ARE THE CASTINGS MADE WITH HOLES THAT ARE LARGER THAN THEY SHOULD BE OR UNNEEDED FOR PROPER COOLANT FLOW?

Engine blocks and heads are sand-cast, meaning sand forms the mold for the casting. The holes must be large enough, and sometimes extra holes must be added, to allow the sand to be completely cleaned from the casting once it has solidified. Also on older engines the holes may not always line up due to “core shift” – that is, the blocks are not always perfectly cast, so the gasket needs to accommodate the fact that different castings may have slightly different hole positioning.

FEL-PRO® GASKETS DESIGN PHILOSOPHY

During the Fel-Pro® head gasket validation process, we sometimes find that holes should be added, deleted, changed in size or moved to better control the flow of coolant through the engine. On certain applications, holes in the head or block will be fully or partially sealed off with the head gasket. While the visual differences may seem extreme, you can install Fel-Pro gaskets with confidence because every hole is precisely placed and sized to ensure that coolant flow is properly controlled by the head gasket.

With this in mind, a Fel-Pro head gasket should never be modified in any way – doing so not only prevents proper coolant flow, but also can affect the gaskets ability to seal, as the specialized coatings can be damaged.



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