
[Total Seal's power ring filer is the size of a shoebox and is sturdy enough to stay planted on the workbench. One end of the motor holds the grinding wheel; the other is a deburring wheel.

# TESTED: TOTAL SEAL'S 110V RING FILER

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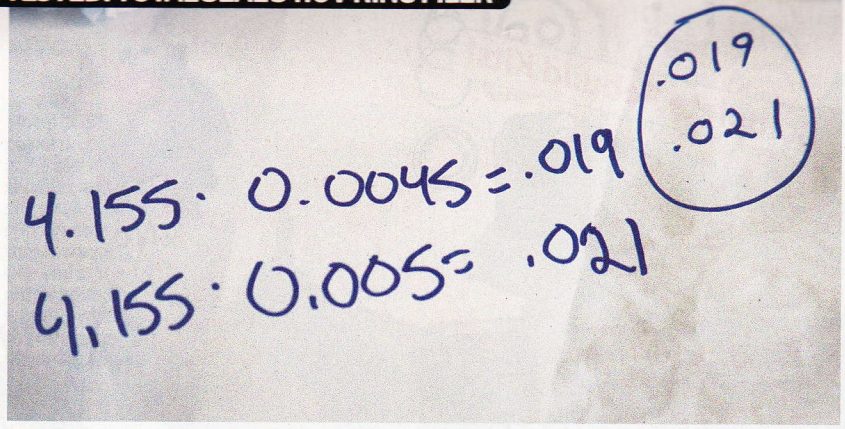
Few processes in assembling an engine are as tedious as filing piston rings. It requires patience and precision, carefully fitting the top and middle rings to each bore. It's not something for an assembly line. Considering the new ring packages used in modern pistons often include thin but tough steel or ductile iron rings that make old cast-iron rings seem soft in comparison, the thought of using our old hand-cranked ring filer gets less and less appealing. That's where Total Seal's 110V power ring filer came in.

The filer uses a stationary motor with an abrasive wheel and a table that moves perpendicular to the wheel with an indicator to track the table's lateral movement. Dialing in travel of the table allows the user to remove measured sections of the ring as the table pivots toward the wheel. We tested it while filing a set of 1/16-inch Mahle rings for a Pontiac 400 stroker.

We're certain that with more time with the tool a user would become even more familiar with its use. For us, we still took at least two cuts with the filer to make sure we didn't take too much initially. We're a little paranoid, it's true, but we think it's better that way, especially considering there are no extra rings in a set and you can't add more material once it's gone. It's still far faster than going at it by hand. By the time we got to the second set of rings, we were in a groove, cutting within one- or two-thousandths after our initial measurement. We'd typically cut in increments of 0.005 inch per pass, just to be safe and consistent.

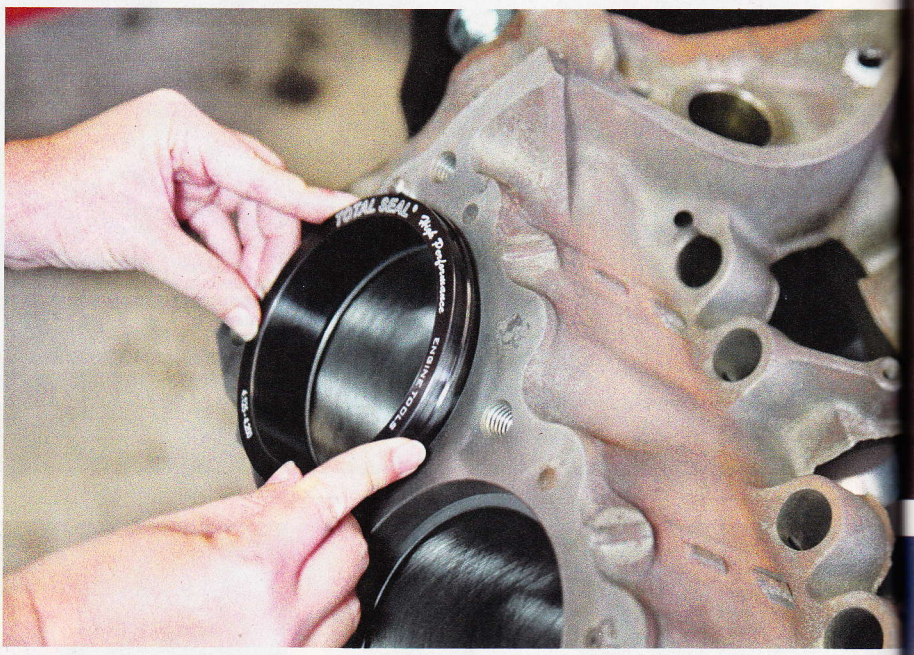
Total Seal's ring filer comes in at around $700, so it is on the high end for engine-assembly tools for a hobbyist. However, if you've got multiple engine builds in your future, the time saving alone becomes worth it.



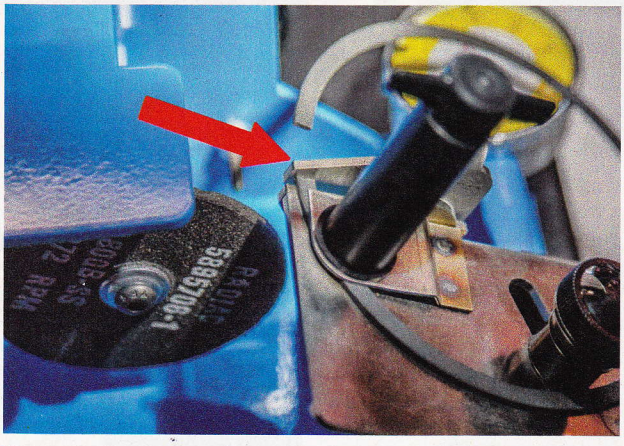

[Mahle provides specs for their ring gaps, which vary by the engine's intended application. Erring on the side of caution, we decided to use the specs for a drag-racing engine, which called for slightly larger ring gaps than those of a street-only engine. At 0.0045-inch gap per inch of bore size for the top ring and 0.005-inch gap for the second ring, our bore size of 4.155 inches meant a gap of 0.01875 inch for the top and 0.02077 inch for the bottom. We rounded those up to 0.019-inch and 0.021-inch, respectively. Then we wrote them down on the paper-covered workbench.

## WHY IS PISTON RING GAP SO IMPORTANT?

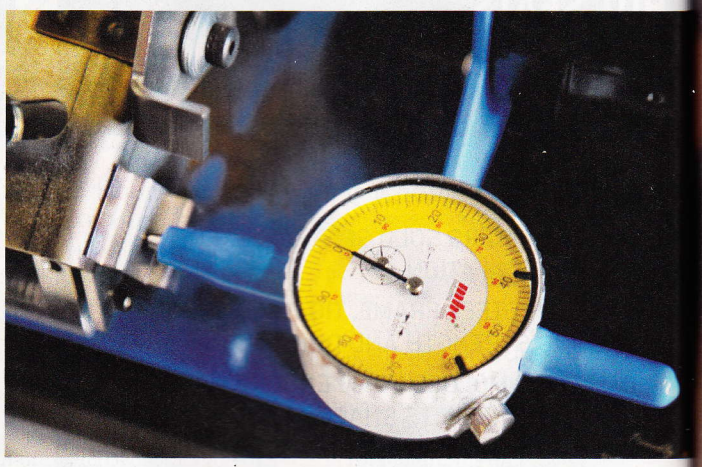
A tight piston ring gap makes for a more efficient engine. The tighter the seal against the cylinder wall, the stronger the signal to the intake, which means the cylinder fills more completely on the intake stroke. On compression, power, and exhaust strokes, a tight gap keeps both the unburned fuel and combustion pressure above the cylinder to put more of each stroke to better use. That also keeps unburned fuel and combustion gases out of the crankcase and out of the oil, leading to better engine longevity due to cleaner lubrication. However, too tight a gap can lead to catastrophe. The piston's ring lands are precision-machined to tight tolerances. If a ring expands due to heat and the gap diminishes to the point that the ends butt up against each other and there's no place else to go, pressure is exerted inside the lands, which can break them.



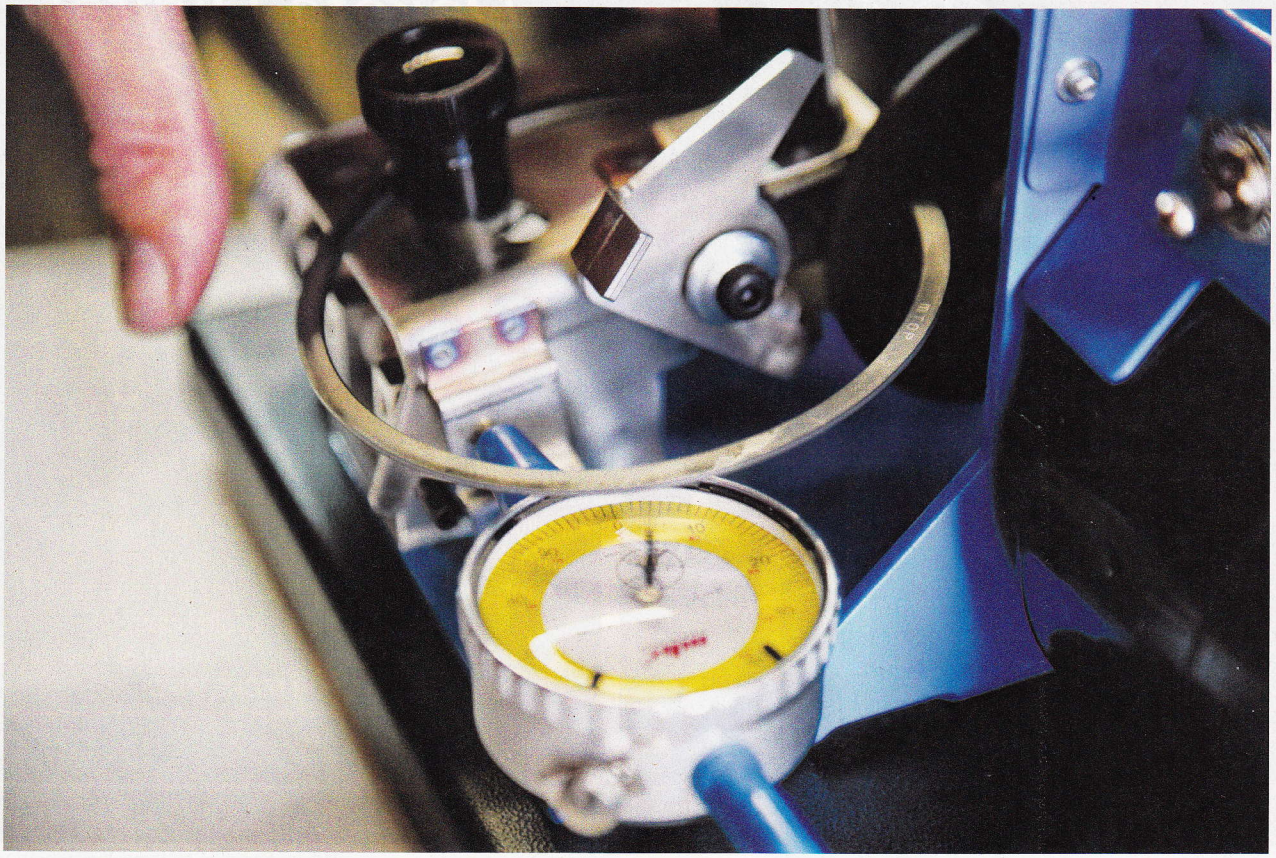

[To know how much to remove from each ring, we first squared each ring in the bore that it would eventually call home. Total Seal's ring-squaring tool makes sure the ring is square in the bore for an accurate measurement. You can use a piston, but the tool has a lip to make sure the ring was pushed to a consistent depth. The hole in the middle also allowed us to pull the ring up in case we'd inserted it too deep. In our case, the ring was nearly touching and we had only three- to four-thousandths clearance in each cylinder.



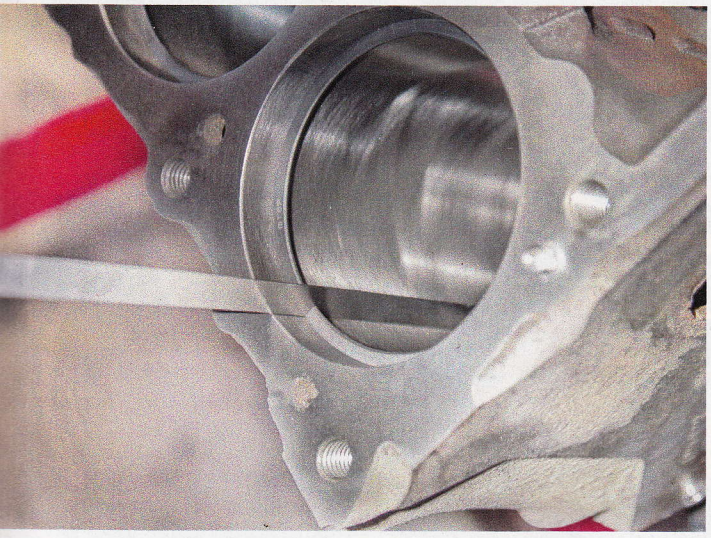
[Serving double duty, this steel plate (*arrow*) squares the ring with the cutting wheel and provides a stop to keep the table from pivoting into the abrasive wheel. The knurled knob on the right is adjustable and once set, makes squaring virtually automatic. We didn't touch it after the first ring. Once the ring is square and touching the squaring plate, it is held in place by tightening the wing nut on the taller post.



[With the motor off and the plate rotated out of the way to allow the table to pivot, we turned the knob on the left of the table to drive the ring toward the abrasive wheel while holding the table down. As soon as we felt contact between the ring and the wheel, we stopped turning and set the dial indicator to zero.



[Since we were just getting familiar with the ring filer, we moved the table 0.005 inch toward the wheel, turned the motor on, and made a cutting pass. Then we checked with the feeler gauge to see how the dial indicator corresponded with the indicator. It seemed to have removed a bit more than 0.005-inch, which we chalk up to our zeroing being slightly more than zero and perhaps 0.001 inch of play in the table's pivot as we applied pressure perpendicular to the motor's axle rather than straight toward the wheel. Our fault. From then on, we were sure to only press the pivoting table straight toward the abrasive wheel. Keep in mind that 0.001 inch is less than the thickness of a human hair.



[Taking 0.005 inch at a time, we crept up on the 0.0019-inch gap of the top ring. Don't force the feeler gauge in place; we found out that 0.0017-inch feeler gauge would fit just right, but a 0.0019-inch feeler gauge could be crammed in the same gap.

## Source

**TOTAL SEAL;** 800.847.2753; TotalSeal.com

[Before the rings are considered done, they must be deburred. A very light touch is all it took to knock off any accumulated metal with the fine-grit wheel opposite the gap-filing table. This can also be accomplished with a razor blade, as the burr tends to be holding on by the narrowest of threads.