

Spears

RACING

Piston ring end gap refers to the clearance or space between the two ends of a piston ring when it's installed in the cylinder bore. This gap is crucial because piston rings expand when heated during engine operation. Without sufficient gap, the ring ends could be butt together, leading to scoring of the cylinder walls, loss of compression, or even engine seizure. Too much gap, however, can result in excessive blow-by, reduced compression, and oil consumption.

Why It's Important

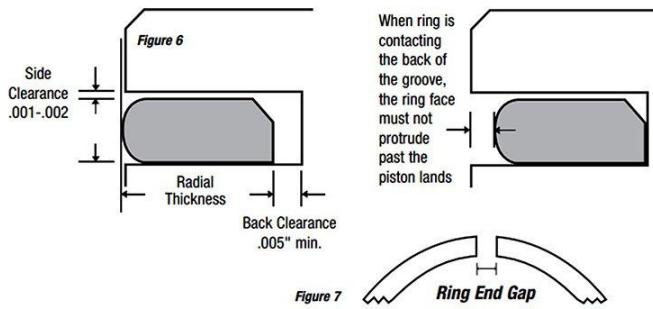
The end gap allows for thermal expansion of the ring material (typically cast iron, steel, or other alloys) while maintaining a seal against the cylinder wall. Factors influencing the required gap include engine type (street, racing, forced induction), bore size, ring material, and operating conditions like temperature and RPM. Always prioritize the specifications provided by your piston or ring manufacturer, as they may vary. Recommended End Gap Calculations gap is generally calculated as a multiplier time the cylinder bore diameter (in inches). Here are common guidelines based on industry standards:

RING INSTALLATION GUIDELINES

IMPORTANT: BEFORE FILING RINGS – Check each individual ring in its corresponding piston ring groove to ensure proper ring groove depth (radial back clearance) and side clearance (thickness)(fig. 6). Proper cylinder finish (honing), ring end-gap, and lubrication are critical to achieving optimum ring seal.

Ring End Gap Table (Use as a guideline only)

	Top Ring	2nd Ring	Oil Ring Rails
Application	Min. Gap Per Inch of Bore		Minimum Gap
High-Perf. Street-Strip	Bore x .0045"	Bore x .0050"	min .015"
Street Moderate Turbo/Nitrous	Bore x .0050"	Bore x .0055"	min .015"
Late Model Stock	Bore x .0050"	Bore x .0053"	min .015"
Circle Track / Drag Race	Bore x .0055"	Bore x .0057"	min .015"
Nitrous Race Only	Bore x .0070"	Bore x .0073"	min .015"
Blown Race Only	Bore x .0060"	Bore x .0063"	min .015"



End Gap

End gap is the clearance between the two ends of a piston ring as it is installed in a cylinder (fig. 7). Most high performance and racing engine builders purchase piston rings slightly oversized in order to file fit them to very precise end gaps. Testing has shown measurable increases in horsepower and decreases in blow-by as a result of properly fitting the ring end gap to the operating conditions. Factors such as supercharging, turbocharging, nitrous oxide, endurance racing and different fuels determine proper ring end gap. Proper ring end gap can more than double from one engine to the next depending upon the above factors.

Precise machining of the cylinder bores is critical, and is the reason why rings should be fitted to the cylinder in which they are to be installed. A diameter variance from one cylinder to the next changes the end gap of the rings in that cylinder by a factor of pi (3.1416). For example, a cylinder .001" larger in diameter will increase the ring end gap by $.001 \times 3.1416 = .003"$, rounding off. The second ring end gap should always be larger than the top ring end gap.



These are starting points—racing or high-performance builds often require wider gaps to account for greater heat. For metric conversions, multiply by 25.4 (e.g., 0.016 in \approx 0.41 mm).

How to Measure and Set End Gap

- 1. Preparation:** Be mindful to have the cylinder at temperature between 65/70 deg. Clean the ring ends of any carbon or debris. Use the actual cylinder bore where the ring will be installed, as bores can vary slightly.
- 2. Insertion:** Place the ring squarely in the bore about 1–2 inches down from the top (to simulate the ring's position). Use an inverted piston or a ring squaring tool to ensure its level is not crooked.
- 3. Measurement:** Insert feeler gauges into the gap until you find the size that fits snugly without forcing. Record this value.
- 4. Adjustment:** If the gap is too small, file the ends using a dedicated ring filing tool (manual or electric). File inward from the outer edge in small increments (0.002–0.005 in at a time), deburr the edges, and re-measure. Never file if the gap is already too large, please replace the ring.
- 5. Verification:** Measure multiple times and check all rings for consistency. Tolerances are often ± 0.005 in or as specified.