

Instructions & terminology

Boring & Honing Instructions

Adherence to proper boring and honing procedure is essential to overall ring performance. To ensure that the bore finish will retain an oil film, it is vital that the guidelines listed below are followed for cast iron bores.

- Install and torque main bearing caps
- Use torque plates. This simulates the distortion that occurs when the cylinder head is mounted to the block. (hint: After boring and honing, leave the torque plates in place and fit/gap the piston rings to their respective cylinders.)
- Allow for a minimum of .003" excess material for use as honing stock.
- Intermediate hone to within .0005" of finished size with #220-#280 grit stones. (With diamond stones use #280-#400 grit.)
- Finish hone with #400 grit stone or higher. (Use #600 grit diamond stone. If using hand operated equipment, set drill speed between 200-450 rpm.)
- Finish with an appropriate stone or tool to achieve desired plateau finish (see below).

Surface Finish

Sunnen® CK® & CV®	Stoner Grit Size	Approx. µRA
EHU-412	150	47-52
EHN-512	220	40-48
JHU-525	220	30-36
JHU-623	280	20-25
JHU-818	400	7-14
C30-C03-81	600	3-5

SAE Specifications

Cast Iron / CK & CV 220 Grit	Molly-Filled 280 Grit	Molly-Filled 400 Grit
70 Grit to -.003"	70 Grit to -.003"	70 Grit to -.003"
220 Grit to size	220 Grit to -.001"	220 Grit to -.0015"
	280 Grit to size	280 Grit to -.0005"
		400 Grit to size

Why a Plateau Finish?

Plateau honing is the popular name for the process that replicates the cylinder bore surface finish normally produced by the rings after they have worn down the surface peaks during "break in". This technique produces flat areas or plateaus (Rk) on the cylinder wall after finish honing by using a very fine grit stone or a PHT type brush tool to remove the peaks (Rpk) from the surface. This lowers the overall roughness average (Ra) while maintaining valley depth (Rvk) in the cross-hatch pattern of the cylinder wall. A high Rvk value is very desirable for its oil retention qualities and will substantially reduce "break in" time and increase ring life.

Ra (Roughness Average) = Used to describe surface roughness as an average between the peaks and valleys that exist in a finish over a specified area, usually micro inches.

Rpk (Peaks) = Average peak height.

Rvk (Valleys) = Average valley depth.

Cross Hatch = The pattern of intersecting parallel lines left after finish honing operations are completed. The smaller the intersecting angle, the larger the area (Rk) between the hone marks.

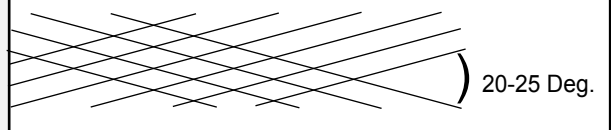
Example of Plateau Finishing

	Surface Finish µRA
Original Bore Size	4.000"
Oversize	0.030"
Finish Size	4.030"
Rough-to-size	4.0250" 75-98
First Finish	4.0290" 30-36
Second Finish	4.0295" 20-25
Third Finish	4.0300" 7-14

Cross Hatch Pattern

Maintaining the proper cross hatch angle is important for two reasons; 1. Oil retention on the cylinder wall and 2. The rate of ring rotation. Excessively shallow cross hatch angles can hinder or slow down the necessary ring rotation that allows dissipation of heat. It can also leave too much oil on the cylinder wall allowing the rings to skate over the surface leading to excess oil consumption. Too steep of a cross hatch angle may not provide adequate oil retention and can result in dry starts and premature ring wear. A steep pattern angle can also create excessive ring rotation that will accelerate ring and piston ring groove wear.

How to Measure Cross Hatch Angle



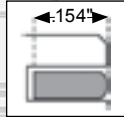
Ring Terminology

Axial Clearance: The distance between the ring axial height and the piston ring groove width.

Axial Height: The width (thickness) of the ring in the axial direction.

Back Clearance: Distance between the inside diameter of the ring and the back of the ring groove when the ring is flush with the ring land.

D-wall: A specification established by the Society of Automotive Engineers (S.A.E.) that dictates the radial width of a standard automotive piston ring by the use of the following formula: Bore diameter divided by 22 = radial thickness (3.386" divided by 22 = .154")



End Gap: The end gap clearance when the ring is compressed to the bore diameter.

Gas Nitrided: A process used to harden the perimeter of a ring where nitrogen atoms penetrate the base material and form an extremely hard outer layer that provides excellent wear and scuff resistance.

A. Neutral Barrel: A term used to describe a piston ring that has no torsional bias or twist.

B. Positive Twist: An asymmetric change in the ring cross section that causes it to twist in an upward direction (toward the piston crown) aiding ring sealing of the top and bottom of the ring groove. Positive twist is used only on top compression rings.

C. Reverse Twist: An asymmetric change in the ring cross section causing the ring to twist downward (toward the piston skirt) that enhances the second compression ring's oil scraping properties.



Radial Width: The width of the ring in the radial direction.

Ring Axial Sides: The top and bottom surfaces of the ring.

Ring Face: The section of the ring that contacts the cylinder wall.

Torsional Twist: The installed position of the ring due to a chamfered area on either ring side that helps the ring cross-seal.

Ring Gaps

As a piston moves down on the power stroke, combustion pressure accumulates in the land area of the piston (between the top ring and the 2nd ring.) This accumulation of pressure can cause the top ring to unseat from its sealing area at the bottom of the ring groove.

This is addressed by increasing the gap area of the 2nd ring. This affords a controlled release of the inter-land pressure, and keeps the top ring seated on its lower sealing surface for improved performance.

Ring Gap Table Instructions

- 1) Cylinder bore size must be in inches. If measuring millimeters, divide bore by 25.4.
- 2) Multiply your bore size by the "x Bore" column for your application.

Proper Ring Gap Measuring Procedure

- 1) Torque Plate should be attached to engine block or cylinder and torqued to specifications.
- 2) Cylinder bore should be free of taper.
- 3) Piston ring should be square in the bore 1" down from the deck.



Proper Ring Gap Filing

- 1) Ring gap should be filed using proper ring gap filing tool.
- 2) Ring gap should only be filed in an inward direction and square to the sides.

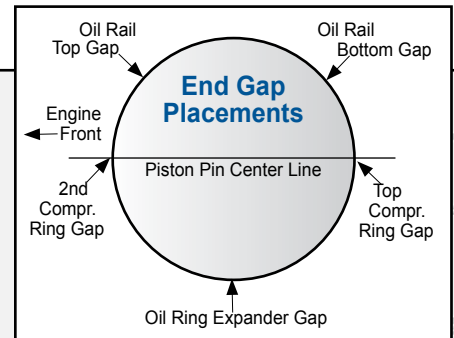


Use caution when grinding ring end gaps - A stone or cutter which is too coarse can remove material too quickly.

Min. Gap Per Inch of Bore

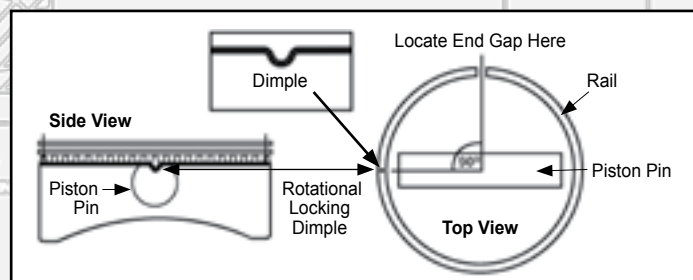
Application	Top Ring Bore x	2nd Ring Bore x	Oil Ring Rail Min. Gap
High-Perf. Street/Strip	.0040"	.0050"	.015"
Street-Moderate Turbo/Nitrous	.0050"	.0055"	.015"
Late Model Stock	.0050"	.0053"	.015"
Circle Track/Drag Race	.0055"	.0057"	.015"
Nitrous Race Only	.0070"	.0073"	.015"
Blown Race Only	.0060"	.0063"	.015"

NOTE: The chart above is a general end gaps guideline. Each ring should be fitted to the particular cylinder in which they are to be installed. The gap on the 2nd ring should always be larger than the top ring end gap, this will help reduce top ring flutter.



Oil Rails & Rail Supports

Wiseco oil rail supports feature a special dimple to prevent rotation of the oil rail. This dimple should be positioned directly in line with the piston pin. Keep the rail support gap 90 degrees from the piston pin bore opening.



Ring Sets containing Oil Rails with a tab (all end with part #VF)

When installed in a horizontally opposed engine, rail gaps should be installed as shown below. The rail tab must be installed below the oil ring expander with the tab facing toward the bottom of the ring groove extending into the split oil drain back hole. Use caution to not install the rail tab into the piston pin oil hole.

