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## INSTALLATION INSTRUCTIONS FOR MTC ENGINEERING PISTON KITS

To check for clearances measure piston across thrust faces 90 degrees from the wrist pin hole at point of largest diameter as pistons are tapered. Recommended procedure is to check piston size and hone cylinder for the desired clearance. Each cylinder should be deburred on top and chamfered on bottom for ease of piston and ring installation. Finish hone with a 280 – 400 grit. A good cross hatch finishing pattern is important for best results. **Caution:** After honing, wash cylinder assembly with soap and water, then wipe cylinder walls with automatic transmission fluid on a clean rag until all tendency of rag to discolor is gone. Washing in solvent will not remove the abrasives from finished cylinder walls.

**Piston to cylinder fit is critical. Advised clearances given are for reference only, each application may vary.**

High Compression  
.0005”-.0015”

Turbo & Nitrous  
.002”-.0025”

Street  
.0005”-.001”

Check ring gap and gap accordingly. All out racing engines: top ring .012, 2<sup>nd</sup> ring .010. Street engines top ring .010, 2<sup>nd</sup> ring .008. Second ring is identified by a letter on the face of the ring. Make sure this letter is facing UP when installing ring on piston.

Place circlip in one side of piston, and slide pin in so circlip pops into place. Make sure circlip gap is at top. Oil pin boss in pistons and rod end. We recommend using Torco MPZ Engine Assembly Lube.

Put rings on piston and stagger gaps. Very Important: **DO NOT OIL RINGS!** By not oiling rings, they will start sealing as soon as engine is started.

Put pistons on rods and put in other circlip making sure circlip is in all the way, you can hear it pop into place.

Put center cylinders up first. Now put cylinder onto pistons. Be careful not to scratch piston skirt or cylinder walls. Rotate carefully and put number 1 & 4 pistons into cylinder. Tap cylinder down on dowel pins. Make sure that cylinder rotates freely once all 4 pistons are in place.

Always use new gaskets and torque cylinder head to manufacturer’s specification. In some instance cylinder head may have to be re-torqued after break-in to insure proper head gasket seal.

**NOTE:** It is very important that valve to piston clearance be checked. We recommend a minimum clearance of .040”.

### WARRANTY DISCLAIMER

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**Check for Proper Ring End Gap**

**Failure to ensure proper ring end gap may cause the ring tips to butt, and engine damage could occur.**

1. A torque plate should be attached to the engine block or cylinder (if applicable), and torqued to specifications.
2. Check the end gap by placing the ring into the cylinder. Cylinder bore should be free of taper. Use the piston to square up the ring in the bore, and check the end gap by using a feeler gage.
3. See table below for proper ring end gap for your application.
4. The oil rails may be installed without modifying the end gap. The gap should be a minimum of .010”.

**Ring Gap Table Instructions**

1. This table is in inches. If you are measuring your bore in millimeters, you will need to convert to inches by dividing your bore size by 25.4.
2. Multiply your inch bore size by the “Bore x” column for your application to determine the end gap.

Example: For the top ring of an ATV with a 4.0” bore, multiply 4.0 X .004 = .016

<b>Application</b>	<b>Top Ring Bore x</b>	<b>2<sup>nd</sup> Ring Bore x</b>
Dirt / ATV / Snow / PWC	.0040”	.0050”
High-Performance Street / Strip	.0045”	.0055”
Street-Moderate Turbo / Nitrous	.0050”	.0055”
Late Model Stock	.0050”	.0055”
Circle Track/Drag Race	.0055”	.0060”
Blown Race Only	.0065”	.0070”
Nitrous Race Only	.0070”	.0075”

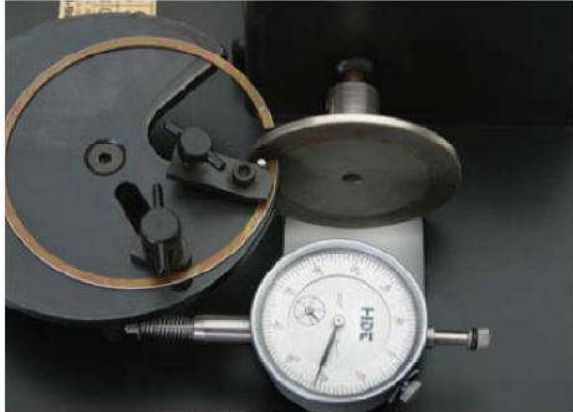
**Notes:**

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

### Filing Gaps

1. We recommend filing ring end gaps using the proper ring end gap filing tool, either an electric ring grinding machine or manual hand crank style grinder. (See Illustrations 1 & 2)
2. Always file from the ring face towards the inside diameter to avoid damaging the face coating. (See Illustration 3)
3. File only one end of the ring. Use the unfiled end as a reference.
4. Be sure to keep end gaps square. (See illustration 4)
5. File until the desired end gap is achieved.
6. Remove all sharp edges and burrs.

**Failure to remove all burrs and sharp edges could cause engine damage.**



ELECTRIC RING GRINDER

Illustration 1



MANUAL STYLE RING GRINDER

Illustration 2

*Magnified photo of incorrectly ground ring end gap. Please use extreme caution when hand grinding, it is possible to chip/flake the plasma moly out of the inlay groove.*

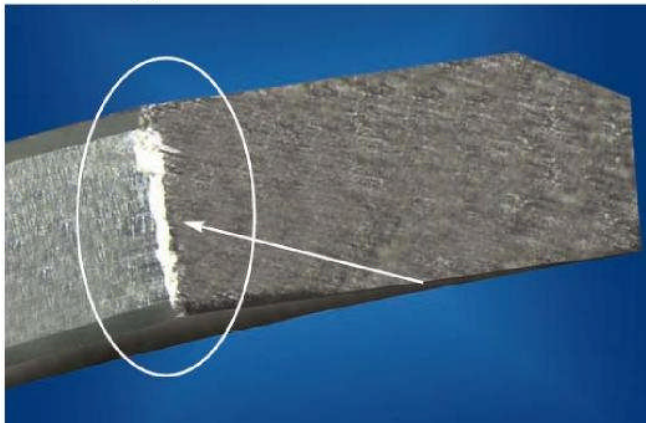


Illustration 3

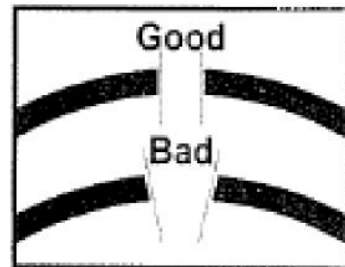


Illustration 4

**Ring Installation (See Illustration 1)**

1. Check each ring in its corresponding piston groove to ensure proper axial and radial clearance. (See Illustration 2)
2. **Oil ring expander:** Place the oil ring expander into the oil groove with the butted tips of the expander 90° from either end of the wrist pin. Be sure the tips of the expander are visible and properly butted (See Illustration 3). **If the expander tips are overlapped, the engine will smoke due to excessive oil use, and engine damage could occur.**
3. **Oil rails:** The oil rails can be installed with either side up. Using a ring expander, install the rails into the oil groove, placing the first rail below the expander, and the second rail above the expander. The rail end gaps should be located at least 90° from each other. After the oil rails are installed, double check that the tips of the expander are properly butted.
4. **Second ring:** Using a piston ring expander (see Illustration 4), install the second ring with the marked side up. An unmarked 2<sup>nd</sup> ring with an inner bevel should be installed bevel side down. If the ring is not marked on one side near the end gap, either side can be up.
5. **Top ring:** Using a piston ring expander, install the top ring with the marked side up. An unmarked top ring with an inner bevel should be installed bevel side up. If the ring is not marked on one side near the end gap, either side can be up. (See Illustration 5)

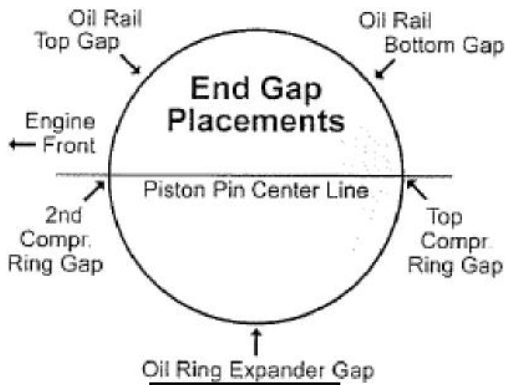


Illustration 1

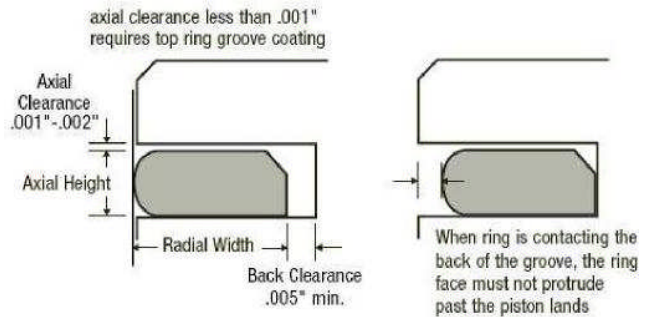


Illustration 2

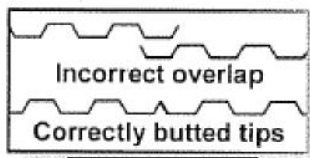


Illustration 3



Illustration 4



Illustration 5