



TOTAL SEAL[®]

High Performance
PISTON RINGS

Set Descriptions

	Good	Better	Best
Gapless® Top Ring sets			
(MS) Sets feature AP steel Gapless top rings, conventional or napier 2nd rings (when available) & standard tension oil rings.			✓
(MSL) Same as above with low tension oil rings.			✓
(MSG) Same as above with Gold Power low tension oil rings.			✓
Application: AP sets are for use in all applications including extreme nitrous and or high boost. Gold power and Low tension oil rings are not recommended for street use.			
(M) Maxseal sets feature ductile iron Gapless top rings, conventional or napier 2nd rings (when available) & standard tension oil rings.			✓
(ML) Same as above with low tension oil rings.			✓
(MG) Same as above with Gold Power low tension oil rings.			✓
Application: All applications including mild nitrous or mild boost. Gold power and Low tension oil rings are not recommended for street use.			
(MX) Maxseal Xtreme sets for sport compact applications feature steel Gapless top rings, conventional 2nd rings and 3 piece standard tension oil rings. Application: Street, race, nitrous, forced induction.			✓

	Good	Better	Best
Gapless® 2nd ring sets			
(TS) Sets feature AP steel top rings, Gapless 2nd rings and 3 piece standard tension oil rings.		✓	
(TSL) Same as above with low tension oil rings.		✓	
(TSG) Same as above with Gold Power low tension oil rings.		✓	
Application: AP sets are for use in all applications including extreme nitrous and or high boost. Gold power and Low tension oil rings are not recommended for street use.			
(T) TS1 sets feature ductile iron top rings, Gapless 2nd rings & 3 piece standard tension oil rings.		✓	
(TL) Same as above with low tension oil rings.		✓	
(TG) Same as above with gold power low tension oil rings.		✓	
Application: TS1 sets are for use in all applications including mild nitrous or mild boost. Gold power and Low tension oil rings are not recommended for street use.			
(X) Xtreme sets for sport compact applications feature steel conventional top rings Gapless 2nd rings and standard tension 3 piece oil rings. Application: Street, race, nitrous, forced induction.		✓	
(S) TSS Street sets feature cast iron conventional top rings, Gapless 2nd rings and 3 piece standard tension oil rings. Application: Street, mild race no nitrous or forced induction 10.5-1 or lower compression.		✓	
(CL) Claimer sets feature cast iron conventional top rings, Gapless 2nd rings and gold power low tension oil rings. Application: Dirt track racing 11:1 or lower compression on race fuel.		✓	

	Good	Better	Best
Diamond Finish™			
Top rings are produced to an axial tolerance of $+/-0.000050\pm$ with a surface roughness of < 4 microinches. Radial tolerance is held to $+/-0.0005\pm$. Face coatings include plasma moly or state of the art proprietary PVD coatings. Diamond Finish™ 2nd rings are produced to the same tight tolerances shown above and are available with a standard taper face or new sharp edge technology napier design.			✓

	Good	Better	Best
Conventional sets			
(CS) Sets feature AP steel top rings, conventional 2nd rings & 3 piece standard tension oil rings.	✓		
(CSL) Same as above with low tension oil rings.	✓		
(CSG) Same as above with Gold Power low tension oil rings.	✓		
Application: AP sets are for use in all applications including extreme nitrous and or high boost. Gold power and Low tension oil rings are not recommended for street use.			
(CM) Classic moly sets feature ductile iron plasma moly (polished moly) top rings conventional 2nd rings & 3 piece standard tension oil rings.	✓		
(CML) Same as above with low tension oil rings	✓		
(CMG) Same as above with Gold Power low tension oil rings	✓		
Application: For use in all applications including mild nitrous or mild boost. Gold power and Low tension oil rings are not recommended for street use.			
(CR) Classic Race sets feature ductile iron plasma moly top rings conventional 2nd rings & 3 piece standard tension oil rings.	✓		
(CRL) Same as above with low tension oil rings	✓		
(CRG) Same as above with Gold Power low tension oil rings	✓		
Application: For use in all applications including mild nitrous or mild boost. Gold power and Low tension oil rings are not recommended for street use.			
(C) Classic street sets feature conventional cast iron top rings, conventional 2nd rings and 3 piece standard tension oil rings. Application: Street, mild race 10.5-1 or lower compression.	✓		

	Good	Better	Best
Advantage sets			
Are designed for use with 5/64 5/64 3/16 ring grooves in classes that require these sizes. Through the use of special sized groove spacers, narrow \pm series style rings and low tension oil rings we can significantly reduce the amount ring drag in these applications.	✓		

Custom sets: Available in a wide array of configurations and applications.

Low Tension oil rings offer an approximate 25% reduction in tension when compared to standard tension.

Gold Power low tension oil rings offer an approximate 40% reduction in tension when compared to standard tension.

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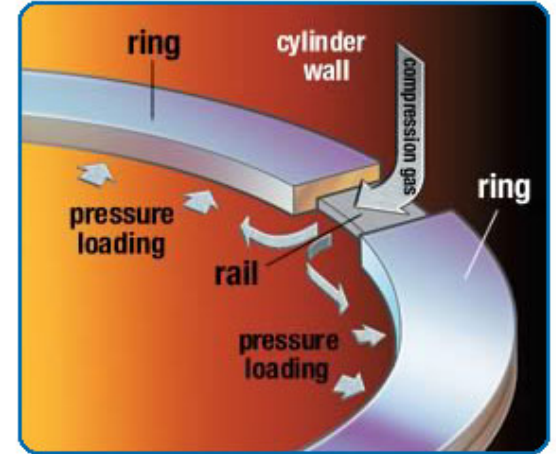
Gapless® Piston Rings

Total Seal's patented Gapless® Piston rings provide increased performance through unmatched sealing of the cylinder and combustion gasses in the combustion chamber. Increased horsepower and torque along with longer engine life are just a couple of the reasons why Total Seal's Gapless® Piston rings are the best rings available. Here are many more.

- Increased horsepower and torque
- Longer engine life
- Saves money (fewer teardowns)
- Improved consistency
- Cleaner engine oil
- Longer ring life
- Better Oil control
- Less friction
- Lower engine oil temperatures
- Wider torque curve
- More engine vacuum
- Increased intake signal

How it Works...

As shown in the illustration, compression gas is deflected by the rail into the piston groove and aid in pressure loading the ring throughout the 4 stroke cycle. At the same time the rail also and most importantly closes off the combustion gas leak path created by the ring end gap. This gap is the primary cause of blow-by in a 4 cycle engine. With a conventional type ring as the ring and cylinder wear the ring end gap increases and the blow-by figures increase. The Gapless® ring blow-by figures are not affected by this wear, as the ring end gap increases it is blocked by the rail portion of Total Seal's patented interlocking 2 piece design stopping the blow-by at the source. Conventional style rings when newly installed will show leak down figures of 7% or higher these figures can quickly exceed 20% or higher after a surprisingly short period of time. Gapless® rings on the other hand when newly installed typically show leak down figures of 2% and lower and should remain the same throughout the life of the engine.



The Total Seal® Advantage

Total Seal® is the leader in Piston Ring technology with the ability to meet whatever special needs you may have. From IMCA modifieds to Nextel Cup and Irl, Total Seal® can fit rings to your piston. We will go out of our way to help our customers, and will make custom sets (backcut, special tensions, etc) for any specific piston you may have.

Ring Installation

Proper preparation is essential to achieving optimum performance from your piston rings. It is imperative that all rings be checked dimensionally with the ring grooves and with the cylinder bore.

Remove any burrs from the piston and the piston ring, they should not have any, but check!

Using a squaring tool put the ring in the bore to be used and measure the ring gap to make certain it is correct for the bore size and application. When measuring the ring gap it is recommended that the ring be below the top of the block at least one inch to avoid any taper from bore recession

Gapless® Top Rings

Application	FUEL	Top Ring	Second Ring	Oil Rail
Street, strip, circle	Gas, Alky, E85	Bore X .0065"	Bore X .0055"	Min .015"
Nitrous up to 150HP	Gas, Alky, E85	Bore X .007"	Bore x .006"	Min .015"
Nitrous 150HP-350HP	Gas, Alky, E85	Bore X .0075"	Bore x .0065"	Min .015"
Nitrous 350HP+	Gas, Alky, E85	Bore X .008"	Bore x .007"	Min .015"
Mild boost up to 15lb	Gas, Alky, E85	Bore X .007"	Bore x .006"	Min .015"
Medium boost 15-30lb	Gas, Alky, E85	Bore X .0075"	Bore x .0065"	Min .015"
High Boost 30lb+	Gas, Alky, E85	Bore X .008"	Bore x .007"	Min .015"
Mild boost up to 15lb	Nitro	Bore X .0075"	Bore x .0065"	Min .015"
Medium boost 15-30lb	Nitro	Bore X .0085"	Bore x .0075"	Min .015"
High Boost 30lb+	Nitro	Bore X .0095"	Bore x .0085"	Min .015"

*Indicates any type of forced induction system.

Gapless® 2nd's or Conventional

Application	FUEL	Top Ring	Second Ring	Oil Rail
Street, strip, circle	Gas, Alky, E85	Bore X .0045"	Bore X .0045"	Min .015"
Nitrous up to 150HP	Gas, Alky, E85	Bore X .0055"	Bore x .0055"	Min .015"
Nitrous 150HP-350HP	Gas, Alky, E85	Bore X .0065"	Bore x .0065"	Min .015"
Nitrous 350HP+	Gas, Alky, E85	Bore X .008"	Bore x .008"	Min .015"
Mild boost up to 15lb	Gas, Alky, E85	Bore X .0055"	Bore x .0055"	Min .015"
Medium boost 15-30lb	Gas, Alky, E85	Bore X .007"	Bore x .007"	Min .015"
High Boost 30lb+	Gas, Alky, E85	Bore X .008"	Bore x .008"	Min .015"
Mild boost up to 15lb	Nitro	Bore X .006"	Bore x .006"	Min .015"
Medium boost 15-30lb	Nitro	Bore X .008"	Bore x .008"	Min .015"
High Boost 30lb+	Nitro	Bore X .009"	Bore x .009"	Min .015"

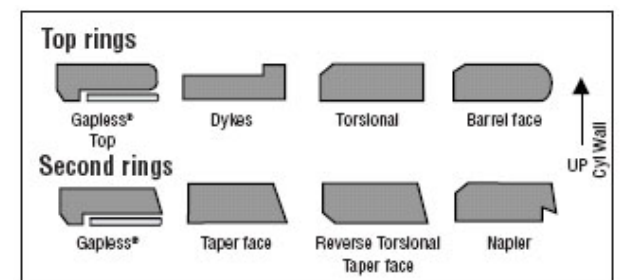
*Indicates any type of forced induction system.

HELPFUL TIPS FOR RING FITTING AND SEATING

All pistons (including new ones) should be checked for proper ring to groove clearances.

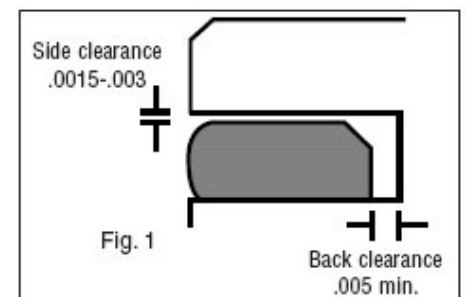
Ring to piston groove back clearance should be a MINIMUM of .005" deeper than radial wall dimension of piston ring. If piston ring sticks out of groove by any amount, you have the wrong rings (see fig. 1).

Ring to groove side clearance should be a minimum of .0015 to a maximum of .003" (see fig. 1).



Boring and Honing

Boring and Honing is becoming a very complicated subject as cylinder finishes become more refined and oils become more slippery. Different honing procedures depending upon ring material, ring tension, block material, and application.



Ring Seating

When first starting your engine to ensure proper ring seating, do not allow the engine to idle for long periods at a time. It is a good idea to mildly load the engine as soon as you can. Highway

driving is a good way to properly seat the rings quickly. Do not idle the engine as idling does not break in any engine. Total Seal® DOES NOT recommend the use of synthetic oils during break-in. After 2000-3000 miles on the street, or one night racing on the track, the rings should be adequately seated so that any oil you prefer can then be used.

Valve Guides and Seals

Total Seal® recommends using a positive valve guide seal preferably made of viton on all applications. Proper valve stem to guide clearances must also be maintained.

Total Seal® FAQ's

QUESTION:

Do Total Seal rings require special cylinder honing?

ANSWER:

No, Total Seal rings do not require special cylinder honing. But they like all piston rings do require proper cylinder honing. One of the most common causes of ring sealing issues today is improper cylinder honing. It's not uncommon to see engine blocks and cylinder sleeves ranging in hardness from approximately 150 to over 300 on the brinell scale. Yet it is very common to see these all of these being honed using the exact same process. The end results vary dramatically. These results are measured with a tool known as a surface roughness tester. The results are measured as Ra, Rz, Rpk, Rk, and Rvk and vary depending on the specific application. Basically these numbers are telling us to how rough the cylinder is and how well it can retain oil. An overly rough cylinder will prematurely wear the rings while an overly smooth cylinder may never seat the rings and can lead to cylinder burnishing. Cross hatch angles can also vary depending on the application, These angles determine the critical ring rotation speed, generally a 45° cross hatch angle will do a very good job. Though some O.E. applications do vary from this, if your not sure check before you proceed. To steep of a cross hatch angle can cause the rings to pump oil, rotate to quickly leading to accelerated ring and ring groove wear. To flat of a angle can cause a chattering affect as the ring passes over the valley preventing the ring from receiving proper lubrication again leading to excessive ring wear. If you're not sure about the proper honing procedures and cross hatch angle for your specific application please give us a call.

The following recommendations are for most general applications.

Ra 10-20 µ in. Rz 10 times the Ra Rk 30-50 µ in. Rpk 5.0-20 µ in. Rvk 50-100 µ in.

QUESTION:

What advantage does the gapless top ring offer over the gapless 2nd ring?

ANSWER:

The Total Seal gapless top ring is the natural evolution of the gapless second. By moving the gapless ring to the #1 ring groove we effectively seal the cylinder closer to the combustion chamber. This not only increases the cylinder seal on the compression and power strokes but also improves the ring seal on the intake stroke resulting in better cylinder filling on a normally aspirated engine. The increased amount of force generated by the combustion process in turn delivers a greater amount of energy to the crankshaft. The choice is yours and either ring offers superior cylinder sealing.

I've been using Total Seal® rings in my engines for over 15 years. They've shown the most significant gains in power through improved cylinder sealing than any gains from cylinder heads or camshafts I've tried. Equally as important is the service and technical support I've received from their sales and tech staff." - Don Ott, Don Ott Racing Engines

We thought this was an accurate quote that many people may question. The following briefly explains why and how piston rings have become such a vital part to your engine's performance and helps to explain why the above statement should be read again.

Piston Ring Function... Sealing for Horsepower.

There are three leak paths for blow-by to escape past the piston into the crankcase and we all know that any blow-by leaking past the piston is horsepower lost. Let's examine one path at a time...



THE FACE OF THE RING °C The face of any compression ring can have many characteristics that may help or hinder cylinder sealing. The profile (barrel, taper, etc) can vary in many different ways that help the ring stay seated through piston rock over. Face coatings can also make a substantial difference with cylinder sealing depending on your cylinder wall material.

THE SIDES OF THE RING °C The side surfaces of the ring, that is the surfaces that seat against the piston flank itself are often overlooked but equally as important in sealing an engine. Simply, the flatter and smoother these sides are, the better they will seal against the piston and stop any blow-by from traveling around the ring land and into the crankcase.

THE END GAP °C Here is the correlation...the larger the end gap, the more blow-by and power reduction your engine will see.

Lets examine the strokes in a four stroke engine and the importance that cylinder sealing means to each...

INTAKE °C On any naturally aspirated engine, the better the rings are sealed inside the cylinder and against the piston, the more intake charge (air and fuel) will fill the combustion chamber. Ring seal is the only thing in a normally INTAKE E aspirated engine that draws air / fuel into the cylinder.

COMPRESSION °C The better the engine is sealed on the compression stroke, the higher the percentage of intake charge that previously filled the cylinder will be utilized. Ring seal is the only thing preventing the charge from leaking past the piston and into the crankcase.

POWER °C During this explosive event, the more explosion the rings keep above the piston, the higher the force will be COMPRESS. exerted downward on the piston, resulting in more torque and horsepower.



Intake



Compress

QUESTION:

Can I use a gapless top ring if my piston is gas ported?

ANSWER:

Yes, Gas porting aids in keeping any top ring seated in high rpm / high cylinder pressure applications.

QUESTION:

Can I break my engine in on synthetic oil?

ANSWER:

Though we have seen it done successfully on occasion we do not recommend it. We have seen the best and most consistent results breaking the engine in on light viscosity conventional oil. Synthetics can be used after completing the break process.

QUESTION:

What should I set my end gaps to?

ANSWER:

Please follow the gapping chart supplied with the ring set. Different applications require different amounts of gap. If for some reason the gapping chart is missing or your just not sure please call our tech line and they will gladly help you make the right choice.

QUESTION:

When file fitting the gapless ring do I need to file rail?

ANSWER:

Yes the ring and the rail need be filed*. Follow the gapping chart supplied with the ring set.

* The rail end gap can be larger than the primary ring but not smaller.

QUESTION:

Which way does the gapless ring go on the piston rail side up or down?

ANSWER:

The gapless ring is always installed rail side down.

QUESTION:

What is Quickseat?

ANSWER:

Quickseat is our patented dry film cylinder wall assembly lube. It's quite unique in that it is a dry lube this helps to prevent glazing of the rings from the over use of assembly oil. It also provides outstanding lubrication during the critical initial start up period helping to prevent ring scuffing and cylinder wall burnishing.



EXHAUST The more efficiently the cylinder disposes of exhaust, the more that event in overlap, will help prime the intake stroke for cylinder filling.

SIMPLY STATED... AN INCREASE IN PISTON RING SEAL RESULTS IN HIGHER VOLUMETRIC EFFICIENCY WHICH EQUALS INCREASED TORQUE AND HORSEPOWER.

Total Seal® has worked hard trying to address each of the circumstances above. We have developed a number of separate ring lines from Gapless® to Diamond Finish™, all intended to improve the sealing of whatever engine you may have. Please look through our catalog, call and ask questions, and Total Seal will work with you to decide which ring set might be right for your situation.

HOW FAST DO YOU WANT TO GO?

TOTAL SEAL® Technology
AP ADVANCED PROFILING™ STEEL TOP RINGS

DIAMOND FINISH™

The flattest, tightest tolerance piston rings available anywhere. Intended for hard core racing and currently in use at the highest levels of STOCK CAR, DRAG and OPEN WHEEL COMPETITION.

Top rings are produced to an axial tolerance of $\pm .000050$ with a surface roughness of <4 microinches. Radial tolerance is held to $\pm .0005$. Face coatings include plasma moly or state of the art proprietary PVD coatings.

Diamond Finish™ 2nd rings are produced to the same tight tolerances shown above and are available with a standard taper face or new sharp edge technology napier design. Combine the Diamond Finish™ top and second rings with our special application oil rings for the ultimate ring set.

GOLD FINISH™

New Total Seal® Gold Finish™ rings utilize tighter tolerances, sharp edge technology and PVD coatings for superior performance. Similar in design and technology to our Diamond Finish™ rings used by the top teams in racing, Gold Finish™ rings are more economical and were developed specifically for Saturday Night and Sportsman level racers.

TNT™ Top ring

This unique hybrid martensitic ductile iron ring is specifically engineered to withstand the rigors of extreme abuse such as in nitrous and forced induction applications. Optional aerospace face coatings make them easy on cylinder walls yielding long life in street or strip applications. Fully machined in house allows us to hold tight tolerances insuring a superior ring seal no matter what the application, so whether you're a professional racer or weekend warrior, the TNT™ Top ring has you covered. Most popular sizes now available, custom sizes by request.

AEROSPACE STYLE COATINGS are one of the most significant advances in the performance engine building industry to come along in years. Total Seal® has done extensive research on which are best for use on a piston ring and its related surfaces. The following is a list our current coatings and their applications.

C-23™ is our pvd-applied face coating reducing friction and wear while offering better heat transfer and is compatible with most cylinder materials and cylinder coatings.

C-72™ is our pvd-applied face coating specifically engineered for hard-coated cylinders it offers the same performance gains as C-23™ with exceptional long term wear characteristics.

C-33™ is our pvd-applied chrome nitride [CrN] face coating for those looking for the same characteristics as a chrome faced ring but without the seating problems commonly associated with chrome.

D-47™ is our side coating used on the top and bottom ring flank offering exceptional ring to ring groove lubricity helping to eliminate micro welding. It is the standard side coating supplied with our Diamond Finish™ rings.

C-92™ is our PVD face coating reducing friction and wear available on Gold Finish™ ring sets.

Total Seal's New coatings are available on Diamond Finish™, TNT™, T-29™ and Gold Finish™ top rings.

ASSEMBLY LUBRICANT

Specifically engineered by Total Seal® to provide proper ring lubrication during initial break in. AL4's clinging nature allows it to stay in place until the engine is placed in service. During initial start up it burns off quickly and cleanly leaving no residue. Used on its own or combine it with Quickseat® for the most advanced piston and ring assembly lubrication available helping to assure fast and complete ring seating.

Gold Finish™

Premium Piston Ring Sets

New Total Seal® Gold Finish™ rings utilize tighter tolerances, sharp edge technology and PVD coatings for superior performance. Similar in design and technology to our Diamond Finish™ rings used by the top teams in racing, Gold Finish™ rings are more economical and were developed specifically for Saturday Night and Sportsman level racers.

TOP RING

- P92 Powermax™
- Heat Treated Ductile Iron
- Barrel Faced
- C-92™ PVD Face Coating
- Lower Coefficient of Friction
- No Moly Flaking
- Parallel Lapped Sides $\pm .0002$
- Fits SAE Piston Ring Grooves
- $.043 \pm .0016$
- D-Wall or PRO Series
- Gapless® or Conventional

2ND RING

- Napier® 2nd Ring
- Sharp Edge Technology
- Less Parasitic Drag
- Improved Oil Control
- $.043 \pm .00140$
- $1/16 \pm .00160$

OIL RING

- Custom Designed Expanders
- Oil Rails Coiled on Bore Size
- Controlled End Gap
- Superior Oil Control
- 3.0mm and $3/16 \pm$



TNT™ Rings

TNT™ Ring Sets feature our latest Hybrid ductile iron technology. The centrifugally spun, heat-treated ductile iron top ring is specifically designed to withstand the rigors of nitrous oxide and forced induction environments. They're quick seating, easy on the cylinder walls and available with our optional PVD coatings for further reductions in friction and increased wear

ability. 2nd rings are cast iron torsional taper face. Oil rings are 3 piece flex vent design. TNT™ Rings are also available in Gapless®.

- TNT™ Top Rings are Centrifugal Cast for Superior Grain Structure
- Engineered for Extreme Abuse such as Nitrous Oxide, Turbocharged and High Cylinder Pressure Applications
- Tighter Tolerances and PVD Coatings, Reducing Friction and Eliminating Moly Flake



Claimer Sets

These sets are specifically designed for racing classes where claiming rules are in affect. Claimer sets feature high quality cast moly top rings, Gapless 2nd rings and Gold power low tension oil rings. Only available in these specific sizes, the claimer set offers unmatched Gapless ring performance at a claimer set price.

Advantage Ring Kits **Use in pistons with 5/64 5/64 3/16 D-wall ring grooves** **NOW AVAILABLE WITH GAPLESS TOP RINGS!!!**

The Advantage ring kits were developed with i°Stock± class Drag and Circle track racers in mind. These kits are for use with pistons that by the rules are required to have a ring groove combination of 5/64 5/64 3/16. Through the innovative use of specially designed rings and spacers the i°stock± class racer can take advantage of the narrow, light weight, low drag rings that the i°Pro± classes have successfully been using for years. Rounding out the package is our special low-tension oil ring created with wet sump engines in mind. Iti°s a commonly known fact that less parasitic loss equals more horsepower. One of the easiest ways to achieve this is through the use of Pro style rings. There are no special tools or machining required. Check the chart for your bore size, if you doni°t see it listed give us a call and wei°ll try to build one specifically for you. Doni°t delay get the Total Seal Advantage and start making some real power before your competition does.

