



#### 01. Why is a forged aluminum so strong?

A. Wiseco pistons and clutch baskets are forged from aerospace grade aluminum for the ultimate in quality and strength. When aluminum is forged, the process compresses the material molecules closer together, making the aluminum more dense and resistant to impact and fatigue. The material properties improve in many aspects, including ultimate strength and ductility, which means the material will bend before it breaks. This is important for high performance race applications, where increases in horsepower and compression will stress the components much further than a stock engine.

#### 02. What is Wiseco ArmorGlide skirt coating?

A. Wiseco ArmorGlide skirt coating is a dry film lubricant applied to the piston skirt. This coating helps reduce friction, improving performance, and will also help quiet the piston in the cylinder bore. This coating is permanently applied, and is not a break in coating, it is on the piston for the life of the part.

#### 03. What is Wiseco ArmorPlating coating?

A. Wiseco ArmorPlating is applied to our RC series pistons, and select Sport Compact pistons. This high performance coating is applied to the piston crown, ring grooves, and piston pin bore. The coating on the dome helps protect the piston from the damage caused by detonation, and will actually harden over time from the heat caused by combustion. This coating is also applied to the ring groove, and helps eliminate micro-welding of the ring, and improve wear of the ring groove along with improving ring seal. The coating in the piston pin bore improves wear, reduces friction, and eliminates material deformation of the locking groove.

#### 04. I just purchased a Wiseco Forged Performance clutch basket, are there any special things I need to do to install it?

A. Thank you for buying the best clutch basket available! Your clutch basket includes detailed instructions on how to install the basket on your vehicle. One important thing to keep in mind is that the backing plate screws must be peened after they are installed, we cannot stress this enough! See your instruction sheet for details.

#### 05. There is no piston to wall clearance on the box label, what is the piston to wall clearance for my application?

A. Wiseco Powersports pistons are designed for optimal piston to wall clearance for the specific bore size of your engine. For example, your 125cc dirt bike engine is 54mm bore, the Wiseco piston is designed just for that bore size, and does not require any specific adjustments to fit properly.

Some applications, such as higher stressed race engines (or nitrous injected), forced induction engines (supercharged or turbos), do require additional piston to wall clearance than Wiseco has designed into the part. These are special applications that are normally built at high performance engine shops. These builders are familiar with the needs of these engines, and can help establish the needed engine set up parameters including piston to wall clearance. As a general rule, any high stress engines that include nitrous, turbo or supercharging, up to high pressure blowers require an additional .001 to .003" clearance.

#### 06. Which way do I install my new Wiseco piston, which direction does it face?

A. Your new Wiseco piston is marked on the top (crown) of the piston, indicating the direction. In most applications, the piston has an arrow intended to point toward the exhaust side of the engine (keep in mind this does not always mean the front of the vehicle).

The Wiseco V-twin piston line is marked in a similar manner, with an arrow indicating the exhaust side. Our Twin Cam piston line includes additional marking indicating the front position of the engine, if viewed from the seat of the bike.

Some Wiseco automotive pistons, such as the Sport Compact or LS series pistons, include a marking that indicates the front of the engine. The front of the engine typically means the cam chain or cam belt / water pump end of the engine. In a rear wheel drive car, this can literally mean the front of the car, and on a transverse engine install (such as a front wheel drive), this will mean the right side of the engine if viewed from the driver position.

#### 07. Does my outboard engine require any special piston adjustments or break-in when I use a Wiseco piston?

A. Outboard engines are very unique, in that the cooling system uses cold water from the lake or ocean. Because of this, the engine cylinder runs very cool as compared to many other engine types, and the piston does require more clearance to operate properly. Your Wiseco piston does have this additional clearance built into the design, and it is always best to follow the proper break in process. This is an extended process of heat cycling of the engine, and will ensure an extended piston life when followed. Refer to your OEM service manual for the proper break in for your engine, or you can also refer to our Marine catalog for general guidelines.

#### 08. My new Wiseco piston kit has flat rings, how do I know which direction the rings are installed?

A. Look closely at the ring near the ring end gap, and you will see a mark on the ring. This mark indicates the top side of the ring, so make sure that the ring is installed with this mark facing up. As a rule, if there is no marking, then the ring can be installed with any side facing up.

#### 09. Will Wiseco rings fit my OEM piston?

A. Wiseco rings and pistons are specifically designed and engineered to work together, and do not interchange with the OEM parts in most instances.

#### 10. What is the proper ring end gap for my 4-cycle engine?

A. Wiseco 4-cycle Powersports piston rings are designed with the proper end gap for most applications. Because 4-cycle engines contain two and three rings, the end gaps do require different values depending on the ring. This chart will help illustrate the minimum ring end gaps:

	Top ring	2nd ring	Oil rail
Most standard engines	0.004	0.005	0.015
Modified engines or Nitrous Oxide	0.005	0.0055	0.015
High performance racing	0.0055	0.0053	0.015
Racing with Nitrous / Turbo	0.006	0.0057	0.015
Blower / Forced induction	0.007	0.0063	0.015

• Multiply your bore size in inches times the value on the table (to convert metric bore to inches, divide your metric bore x 25.4. For example, 77mm divided by 25.4 = 3.0314", multiply this times the value on the chart).

• Note: If your piston contains only a top ring and oil set, simply omit the second ring requirements

#### 11. What is the proper ring end gap for my 2-cycle engine?

A. Wiseco 2-cycle Powersports piston rings are designed with the proper end gap for most applications. However, Wiseco does recommend verifying the ring end gap when assembling your engine, as the end gap can affect the engine working properly if not set correctly. As a general rule, most engines will require .004" per inch of bore diameter for intended ring end gap minimum. More extreme engine applications, where the piston and ring will experience excessive heat, it is recommended to use .005" per inch of bore diameter ring end gap minimum. Generally, when measuring ring end gap, it is most always better to have too much than too little; a tight ring end gap can potentially cause the ring ends to touch during operation, which may cause a failure. Some marine and snowmobile engines do require additional clearance, so Wiseco does recommend additional allowance for these applications. See your Wiseco piston installation instructions included with the piston kit for more detail.

#### 12. How can I tell if my cylinder bore is Nikasil, cast iron, or chrome, and will Wiseco rings work in my cylinder?

A. Most modern Powersports engines use a Nikasil (Nickel Silicon) type of material plated onto the aluminum sub-material. Nikasil appears shiny (like chrome) when new, and is highly resistant to wear. All Wiseco rings are compatible with Nikasil, and will offer long service life and great sealing and performance.

Some other popular versions of Nikasil-like cylinder bore coatings can be called Electrofusion (Kawasaki) and Boron Composite (Suzuki). All Wiseco rings are compatible with these materials.

Some older model engines still use cast iron cylinder walls, which is a sleeve that is either inserted or cast into the cylinder. All Wiseco rings are compatible with cast iron sleeves. A cast iron sleeve will appear somewhat obvious, where the liner will be a different color than the cylinder, will appear to be a separate piece of the cylinder, and will attract a magnet.

Some older model engines use a chrome plated cylinder, and are becoming harder to find. A chrome cylinder can appear like a Nikasil cylinder, so it is always good to research your engine prior to installing a ring. Only some Wiseco rings are compatible with chrome plating. These ring types are normally non-coated, such as a cast iron ring face, to prevent the ring from scuffing the bore and not working properly.

#### 13. My engine bore is listed in millimeters, why are Wiseco ring end gaps listed in inches?

A. To convert your metric bore diameter to inches, grab your calculator and divide your millimeter bore by 25.4. The result will be inches, and then multiply this number by .004 (or .005 depending on your application), and the answer will be the minimum ring end gap. Here is an example of the math:

• 54mm bore divided by 25.4 = 2.1259

• Multiply your bore size in inches times the value on the table (to convert metric bore to inches, divide your metric bore x 25.4. For example, 77mm divided by 25.4 = 3.0314", multiply this times the value on the chart).

#### 14. How do I put together the oil ring assembly, it wants to fall apart and overlap when I try to install it?

A. Modern oil ring assemblies can be complex, and difficult to install, due to the delicate nature of the oil rails and the center separator. It is very important that the oil assembly be installed correctly on the piston, and collapsed into the cylinder, to operate correctly. It is always best to install the oil separator first, and then the bottom oil rail. Make sure that the oil separator is butted and not overlapped at the point, before installing the second oil rail. It is also a good practice to stagger the end gaps of the oil assembly pieces so that the rail and separator gaps do not line up, this will help ensure that the assembly stays together as the piston is installed.

One useful tip to try when assembling the rails onto the separator is to apply a dab of thick grease to the ends of the separator to hold the gaps in place.

Using a ring compressor is also important when installing the piston into the cylinder. This will help ensure that the oil assembly (and the top compression rings) will glide into the cylinder. Some engine builders are able to slide the piston assembly into the cylinder without a ring compressor; this method takes experience and patience.

#### 15. My new Wiseco 4-cycle piston kit has three rings, how do I know which ring goes where?

A. Most 4-cycle Powersports pistons use three rings, and knowing which ring goes where is critical. Generally, most top compression rings are steel alloy, and will appear shiny and bright, and will sometimes have a coating or treatment to the face of the ring. These coating could be industrial chrome (dull silver), gas nitride (bright silver), titanium nitride (gold), or moly filled (dark grey). Most rings will also have a top side marking, which is to be facing upward when installed.

Most second rings are of a cast iron material, though some can be steel. These are typically dark in color, and the face of the ring will be tapered. The ring will also have a top side marking, which is to be facing upward when installed.

Most Wiseco oil ring assemblies are three piece type, containing two oil rail rings and a center oil separator. These assemblies are delicate in nature, and can be tricky to install correctly. See our other FAQ questions for information on how to best install this type of ring.

#### 16. Why is there a pin in the ring groove on my Wiseco 2-cycle piston?

A. The pin located in the ring groove is important to the operation of your 2-cycle piston. The pin is known as a "locating pin", and is meant to hold the ring end gap in place, preventing the ring from rotating in the cylinder bore. A 2-cycle engine has port windows located along the cylinder wall, and the ring end gap must be prevented from rotating into one of these port windows, and potentially snagging the ring. If this were to happen, the piston and ring will become damaged, along with the cylinder. It is critically important that the ring end gap be located over these locating pins when installing your new Wiseco piston.

#### 17. What is minimum piston to valve clearance?

A. When assembling your 4-cycle engine, it is sometimes important to verify that you have adequate clearance from the piston to the valves. If you are installing an aftermarket racing camshaft, this becomes even more important to measure. The usual rule of thumb for piston to valve clearance is .080" intake side, and .100" exhaust side. These are relatively "safe" values that apply to most any engine. Some engine builders may cheat these values down to .060" intake and .080" exhaust, and Wiseco recommends discussing these lesser values with your camshaft supplier.

#### 18. Can you explain what a groove lock spacers is and how it is installed?

A. Whenever it is necessary to put the wrist pin bore into the oil ring groove, it is necessary to keep the oil ring end gaps from rotating and falling into the open pin bore. Wiseco developed and uses a dimpled spacer. The spacer is installed before the oil ring assembly, with the dimple down in the pin bore, to keep it from rotating.

#### 19. What are the Anti-detonation grooves on the top ring-land and the Pressure-grooves on the second land for?

A. The Anti-detonation grooves provide several advantages, which include further atomization of the combustion charge to prevent damage to the piston and ring caused by pre-ignition. These grooves also prevent carbon build up on the ring land which can cause the compression ring to stick in the ring groove.

The pressure seal groove will prevent gas build up below the top compression ring; these gases can cause the ring to lift from the ring groove. Unseating of the ring will result in compression losses and lower performance.

#### 20. How do you calculate compression ratio?

A. Compression ratio is the volume of the cylinder when the piston is at the bottom of the cylinder compared to where it is when the piston is at TDC. For example, a 100 cubic inch cylinder would have its volume squeezed into 10 cubic inches with a 10:1 ratio.

The easiest way to understand this is to think of everything as volumes that are stacked on top of one another. The elements that comprise this stack up are the displacement of the cylinder (bore and stroke), the volume of the deck compression and the head gasket (which is basically a short-round cylinder), and the volume of the combustion chamber. The net combustion chamber volume is affected by the piston geometry, and this simply means you must subtract for a positive dome volume add for a piston dish volume.

Use the formula bore x bore x stroke x .7854 x 16.4 to convert the cylinder volume to cubic centimeters (cc's). Stack up the cylinder+ the deck volume + the gasket volume + the net chamber volume, and take this number and call it A. Next, stack up the deck, the gasket, and the net chamber volume and call it B. Lastly, divide the larger number A by the small number B, the result will be the compression ratio.

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