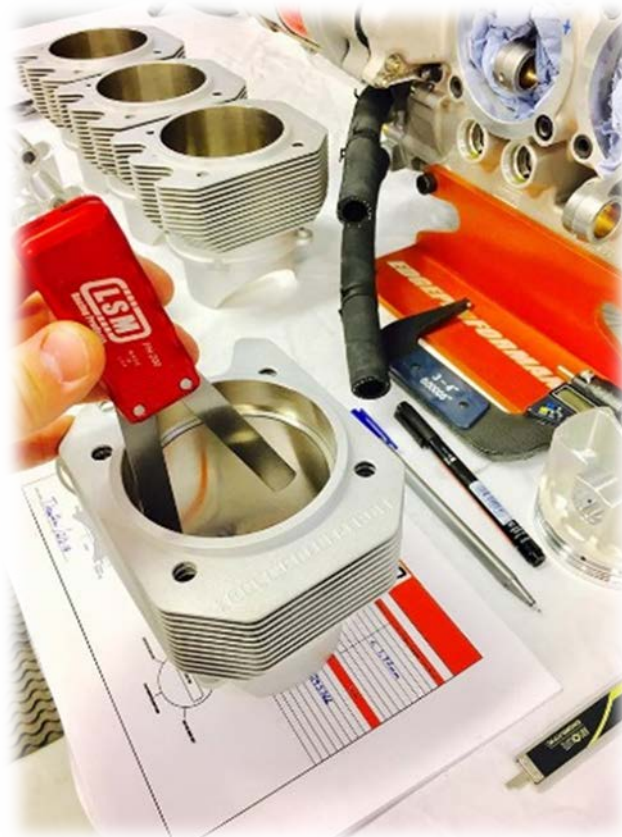




EdgePerformance AS 1417 & 1484 cc Big-Bore Kit Installation instructions

Kit components must be properly prepared before removing the old cylinders and pistons. If you ordered the quick-install option, go directly to step 8. Please read all instructions thoroughly before starting.

1. Unpack cylinders and pistons. Wash in hot soapy water to remove any residue from the diamond honing process. Dry with a soft towel or compressed air. To ensure removal of all moisture, spray with Loctite 7063 Super Clean or regular brake cleaner. Do not perform this task until you are ready to install pistons into cylinders.
2. Apply mineral oil or similar Joe Gibbs BR 15w-50 break-in oil to cylinder walls.
3. Check fit every piston ring into the top of each cylinder and measure the ring gap with a feeler gauge.



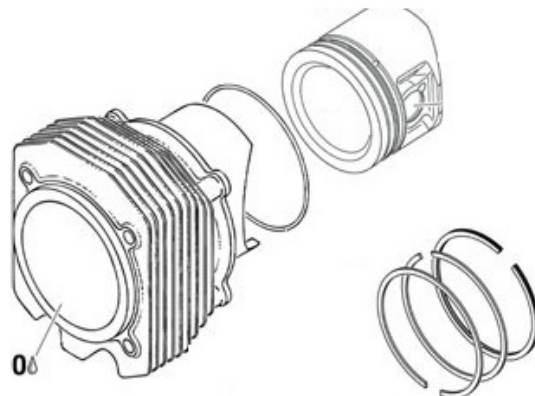
5. Ring gaps may need to be filed to have the correct gap with a manual or electrical ring grinder. Make sure to debur the ring ends after grinding. The proper ring gaps are listed on page 5. See image of ring grinding tools below. These tool are available from Speedway, SummitRacing, eBay, etc.



6. Install the piston rings onto the pistons. Start with the middle oil scraper spacer, followed by the lower and upper oil scraper rail rings. Next do the 2nd compression ring, and lastly the top ring. A good tip is to use a piston ring plier/expander carefully. Make sure not to scratch the piston surface, and lubricate both the pistons and rings generously with mineral oil.



7. Now orientate the pistons rings as shown below. The two oil scraper rail rings shall be 180° apart with one joint facing up at 12 o`clock and the other joint facing down at 6 o`clock. The 2nd compression ring should have the joint facing up at 11 o`clock, and the top ring joint facing down at 6 o`clock.



8. Number the cylinders and pistons 1-2-3-4 and install one circlip into each piston. Make sure to install the circlips so that you can access and install the second one when sliding the cylinder and piston assembly onto the engine. Install the pistons from the bottom of the cylinders by gently compressing the rings until the piston slides easily into the cylinder. Unlike the stock pistons with offset wrist pins, our pistons have a centered wrist pin with symmetrical crowns, so no particular piston orientation is required. Just ensure that the piston remains oriented with the installed piston pin circlip on the aft (flywheel) side.

Removal of the old cylinders and pistons

9. Drain engine coolant by removing the expansion tank cap and the M6x35 stainless steel allen screw with copper washer located at the bottom of the water pump.
10. Remove all 4 exhaust manifolds. Remove the M6 allen screws from intake manifolds so they can each be lifted out of the way. Remove upper & lower coolant hoses on the cylinder heads. Stuff rags or paper into exposed ports to prevent loose objects from falling into them.
11. Number the heads and valve covers 1-2-3-4 with a marker to ensure reinstallation in the same location.
12. Remove valve covers. Keep the M6x30 mm Allen screws and washers with the covers. Check the integrity of both O-rings (large one around the perimeter, small one in the center hole). These O-rings are highly recommended to replace. If not inspect for leaks after first test run.
13. Loosen the head bolts $\frac{1}{4}$ turn at a time until completely loose (to prevent warping). Remove the head while keeping the pushrods in the pushrod tubes. (Each rod is mated to its respective valve. If a push rod falls out, ensure that it goes back in the same way it came out. If the rods get mixed up, they must be replaced.)
14. Start by removing the two front cylinders (1 & 2). Slide each cylinder off the studs, catching the piston so the connecting rod does not slam into the crankcase. Leave the piston hanging in the connecting rod and stuff a clean shop rag or towel into the crankcase to prevent loose objects from falling into it. Remove the front piston pin retaining clip (facing the propeller) using a small screwdriver in the notch at the bottom of the wrist pin hole. The wrist pins may be loose enough to extract by pushing them out with your fingers. If too tight, use a wrist pin extractor (Rotax part no. 877091 or similar). Remove the rear cylinders (3 & 4) and pistons in the same manner.
15. Clean the cylinder mating surface on the crankcase with Loctite 7063 Super Clean (or standard brake cleaner) and wipe dry.

Installation of new cylinders and pistons

16. Check all cylinder studs for tightness (removing the old heads may have loosened the studs). Retorque each stud to 3 Nm (26 in-lbs) using a double-nut technique (may require using standard M8 x 1.25 nuts rather than the stock flanged nuts). Thread two nuts onto the stud and tighten them against each other. Then tighten the stud by applying torque to the outer nut.
17. Clean the base of the cylinders and cylinder heads with Loctite 7063 Super Clean (or standard brake cleaner) and wipe dry. Apply a thin coat of Wacker P12 high-temp silicone grease on the mating lugs on the top of the cylinder.

18. Apply the cylinder base O-rings and install the new cylinders with pistons in place in the reverse order of removal. Start with the rear two cylinders. Apply a generous amount of break-in oil to the wrist pin and wrist pin bore. Slide each cylinder onto the case studs and align the connecting rod with the wrist pin hole in the piston. Ensure that the installed piston pin circlip faces aft. Push the wrist pin through the connecting rod from the front until it lands on the aft piston pin circlip. Install the front piston pin circlip. Now slide the cylinder all the way down so that it mates with the crankcase. Ensure to hold the cylinders install in place with your hands while you turn the crankshaft to extend the connecting rod that you are installing the next cylinder and piston assembly onto.

19. Carefully slide the cylinder heads with onto the stud bolts. Ensure the piston on the cylinder you are working on are at TDC. Right before the push rod tubes enters the bores in the crankcase, install the pre-oiled 16x5 O-rings on to the oil return (pushrod) tubes. Ensure that these O-rings are generously lubricated with engine oil. With the head and cylinder almost touching, gently push the head and cylinder together until the centering lip on the top of the cylinder fully engages into the recess in the cylinder head. Now push the cylinder head and cylinder together as a unit toward the crankcase while working the oil return tube O-rings into their receptacles until the entire assembly mates with the crankcase. Inspect the oil return tube O-rings carefully to ensure that they have been pushed evenly into place without getting pinched or rolled. Secure the cylinder head with two flanged M8 cap nuts (these go inside the valve cover) and two flanged M8 hex nuts.

IMPORTANT: To ensure a constant tightening torque, lightly grease the flanges on the M8 cap and hex nuts.

Initially tighten the M8 cap nuts and hex nuts diagonally and evenly no more than finger tight. Reinspect the return tube O-rings carefully before torquing the heads any further. If there is any doubt about the integrity of the O-rings, remove the cylinder head and carefully inspect them for cuts or tears. (Consider having spares handy (Rotax part no. 850930).)

20. Repeat steps 14 and 15 on the two front cylinders and heads.

21. With all four cylinders and heads in place and evenly aligned, attach a cylinder head aligning tool (Rotax part no. 877262) on top of the intake ports with four M6x25 mm allen screws as shown in Figure 1 below. With the aligning tool in place, torque heads evenly to 5Nm according to the tightening order shown in Figure 2 below. Remain sensitive to any binding or uneven movement. The importance of even tightening and ensuring the integrity of the oil return tube O-rings cannot be overemphasized. Heads are to be torqued according to the heavy maintenance manual, and depending on the cylinder head and stud P/N that you engine has. Refere to the Rotax HMM.

Figure 1
Cylinder Head Aligning Tool

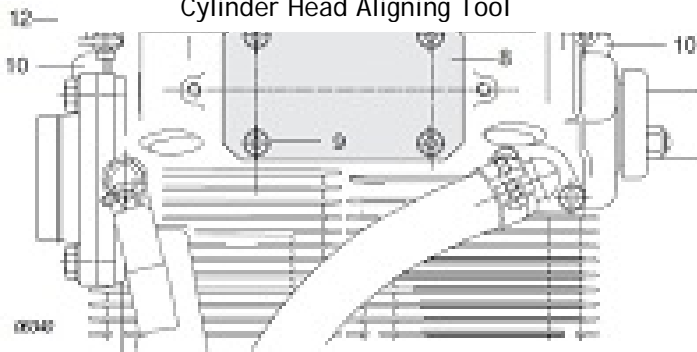
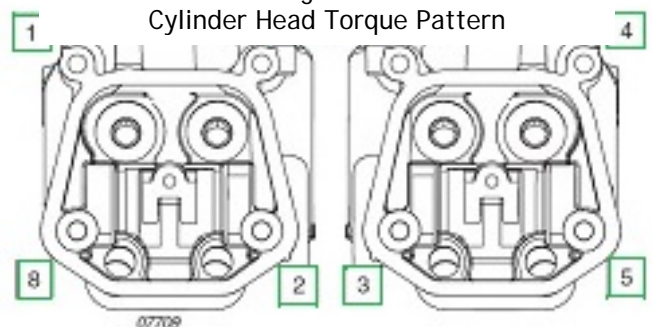


Figure 2
Cylinder Head Torque Pattern



22. Install valve covers ensuring that both O-rings are in place, one large one around the outside perimeter and a small one in the middle that seals the M6x30 Allen screw (Rotax part numbers 250285 and 430205, 4x ea). Torque the M6 Allen screws with flat washers to 10Nm.

IMPORTANT: Adjacent valve covers must not touch each other. There must be a gap of at least a 0.2 mm (0.008 in) between them.

IMPORTANT: The length of the M6 valve cover screw must be 30 mm and the valve cover O-rings must hold pressure. If this screw is loose or if the valve cover leaks, blow-by pressure will not build up sufficiently to return oil to the oil tank.

23. Install both intake manifolds and the two upper coolant hoses located under and adjacent to each intake port. Ensure O-rings are in place in each intake port (black) and coolant port (red). Before tightening the intake manifolds, install the coolant hose fitting that sits below the intake manifold. Torque intake manifold and coolant flange M6 Allen screws to 10Nm.

24. Install new spark plugs. Always use NGK DCPR8E on the 1484/1621cc big bore kits and NGK DPR9EA-9 for the 1417cc turbo big bore kit. Put a small amount of Wacker P12 silicone high temperature thermal conductivity paste on the middle threads as shown below. (Thermal paste only needs to be applied once) Torque to 20Nm.



NOTE: Rotax recommends using Wacker P12 Silicon Thermal Paste but less expensive alternatives include Dow Corning 340 Silicone Heat Sink Compound Lubricant Grease or MG Chemicals 860 Silicone Heat Transfer Compound. Both are available through Amazon.com. Individual packets are available online through Aircraft Spruce or Leading Edge Air Foils and others.

25. Install exhaust system and the 4 lower coolant hoses.
26. Fill waterspider with Glycol 30/70 or 50/50 mix or Glycol and distilled water (Do not used tap water).
27. Fill the oil tank with Joe Gibbs 15w-50 break-in oil or similar. Start with 2.7 liters.
28. The oil system must be purged with compressed air according to Rotax Service Instruction (SI-912-018)
29. Start the engine and let warm up. Idle at 2500rpm and look for leaks. Tighten hose clamps etc after engine has become hot. One you have reached normal operating temps, shut down engine.

- 30. Start up the engine again and do a wide-open-throttle check. Carefully monitor the static RPM. Fixed pitch propellers might need to be replaced. Ground adjustable propellers might need to be re-pitched. Constant speed propellers might need to have the end stop micro switches adjusted to not overspeed the propeller. Aim for >5500rpm static on a fixed or ground adjustable prop. 5700-5800rpm on a CS propeller. It is important that you monitor the EGT limits while putting the engine under load and high rpm. Refer to the Rotax Operation Manual for EGT limits. Typically aim for 750-780°C on WOT and 760-800°C while on cruise. A wideband O2 lambda sensor is also a useful tool for tuning. Installing larger jets may be necessary.**
- 31. Operate the engine at various engine rpms and loads on the ground for preferably 30-60 minutes and replace the break-in oil with AeroShell Sport Pluss 4 or similar and change oil filter. Inspect filter and magnetic drain plug for any fragments.**
- 32. As the cylinders are nikasil plated they would need to be run on a fairly high rpm in order to break-in the rings and to stabilize in terms of oil consumption. Some customers report the cylinders might burn some oil the first 10-20 hours. Others claim the first 50-100hrs. But we see this all the time on new original 912/914 engines as well.**
- 33. Go out flying and feel the power !**

84/86mm Turbo pistons

Top ring - 0.021" - 0.022"

2nd ring - 0.032" - 0.033"

Oil scraper - 0.015" - 0.050"

88mm NA pistons

Top ring - 0.019" - 0.020"

2nd ring - 0.030" - 0.031"

Oil scraper - 0.015" - 0.050"

92mm NA pistons

Top ring - 0.020" - 0.021"

2nd ring - 0.031" - 0.032"

Oil scraper - 0.015" - 0.050"

