



PRECISION PERFORMANCE
SINCE 2002



TECHNICAL LIBRARY

AIRCOOLED ENGINE WITH NICKIES™ CYLINDERS

BASIC ASSEMBLY AND BREAK-IN INSTRUCTIONS

As the builder, you accept full responsibility and warranty for the rebuild. These recommendations are guidelines (not a service manual) and are not intended to be a complete list of items to be checked, rebuilt, or replaced during any rebuild.

- 1 Cylinder bores must be cleaned first to remove all traces of honing oil and Nikasil dust.
 - ▶ Scrub cylinder walls and mating surfaces with hot water and soap then clean thoroughly.
 - ▶ Use denatured alcohol or similar solvent using Kim-Wipes until wipes come out as white as they go in. **Skipping this step will lead to poor engine operation or failure.**
- 2 Shelf LN Engineering Nickies cylinders are not cut for factory sealing rings, gaskets, or o-rings. Cylinders can be special ordered with these provisions if required.
- 3 Ring end gaps must be checked and gapped if necessary depending on ring supplier, material, and application and can vary from .002" to .004" per inch of bore.
 - ▶ For applications where aluminum Nikasil cylinders were used by the factory and you are using OEM rings, refer to factory specifications for ring end gaps.
 - ▶ In all other instances, please refer to piston/ring manufacturer for recommended ring end gaps.
 - ▶ Please note that in some cases ring end gaps may be larger than the recommended specification.
 - ▶ Rings should be light checked with ring gauge for best results.
 - ▶ Only gap piston rings with the appropriate piston ring gapping tool and deburr with a jeweler's file.
 - ▶ Use of a tapered sleeve ring compressor is recommended to prevent breaking of piston rings during piston installation.
- 4 Unless otherwise specified, pistons supplied by LN Engineering have no wrist pin offset. Intake valve pockets are typically larger and deeper than exhaust and determine proper piston orientation. **Porsche 356/912 pistons only have an exhaust valve pocket unless required.**
- 5 In most cases, typical piston to cylinder clearance for an air-cooled Nickies cylinder will be .0015" min - .0025" not inclusive of piston skirt coatings.
- 6 New head studs should be installed and properly torqued to head stud manufacturer recommendations.
- 7 Cylinder heads and case deck must be properly reconditioned and resurfaced and skipping this step will lead to cylinder leaks at head and case.
- 8 Compression ratio is calculated assuming a 68cc chamber for 2.0-2.7 engines and 90cc for 3.0-3.6 engines and .040-.060" deck.
 - ▶ Due to variation in chamber volume for Porsche 356/912 cylinder heads chamber volume must be known before ordering piston to ensure correct compression ratio.
- 9 Base shims may be required to achieve the required .040-.060" deck height to set your compression ratio.
 - ▶ A minimum of .003" clearance (measured on diameter) between the cylinder skirt and ID of the shim is required for copper or aluminum base shims
 - ▶ Minimum clearance is .008" for steel base shims.
- 10 Please refer to instructions from the piston/ring manufacturer for minimum valve to piston, piston to head, and piston to rod clearances as well as ring orientation.
- 11 Do not install pistons/rings dry. Use supplied assembly lubricant or appropriate break-in oil only after components have been properly cleaned.
- 12 Elring Curil-T, Curil-K2, or appropriate non-hardening fuel/oil resistant sealant should be used on cylinder bases and base shims/gaskets to ensure proper sealing of the crankcase.
- 13 **DO NOT USE SYNTHETIC OIL FOR ASSEMBLY OR BREAK IN. USE APPROPRIATE NON-SYNTHETIC BREAK-IN OILS AND ASSEMBLY LUBRICANTS.**
- 14 Fuel filter, if serviceable, must be replaced. New fuel injectors should be used. If new ones are not available, original ones must be professionally rebuilt. Fuel older than 30 days must be pumped out - old gas kills new engines. Damage caused by faulty injectors or bad gas will not be warrantied.
- 15 Proper engine break-in is critical as well as air/fuel mix. Overly rich mixtures during break-in will result in engine damage or failure. Suggested reading on engine break in can be found here:
 - http://www.mototuneusa.com/break_in_secrets.htm
 - <http://www.aircooled.net/vw-engine-break-in-procedure/>
- 16 Break-in oil should be used for 500-1000 miles, followed by conventional oil for 3000-5000 miles until engine is fully broken in before switching to synthetic oils. **Do not track any engine on break-in, intermediate or street oils.**

Questions about pistons, rings, and end gaps should be directed to piston/ring manufacturer:

JE Pistons - (714) 898-9763

CP Pistons - (949) 567-9000

Mahle Motorsports - (828) 650-0817

Please direct all product support inquiries to LN Engineering at <http://support.lnengineering.com/> or by calling 815-472-2939 M-F 8:30-5 CST. Warranty or return requests must be initiated through original point of sale and require authorization by reseller and LN Engineering.