



PRECISION PERFORMANCE
SINCE 2002



TECHNICAL LIBRARY

WATER-COOLED ENGINE WITH NICKIES™ CYLINDER SLEEVES

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 & 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 Ring end gaps must be checked and gapped if necessary depending on ring supplier, material, and application.
 - ▶ For applications where 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.
- 3 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.
- 4 Piston cylinder clearances will vary depending on piston manufacturer and skirt coating options. Please refer to the piston build sheet for more information.
- 5 New head studs (or bolts) should be installed and properly torqued to head stud / bolt manufacturer recommendations.
- 6 Cylinder heads must be properly pressure checked, reconditioned and resurfaced.
- 7 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.
- 8 Do not install pistons/rings dry. Use supplied assembly lubricant or appropriate break-in oil only after components have been properly cleaned.

- 9 OEM piston wrist pin wire-locs are not compatible with aftermarket pistons.
 - ▶ Test fit wrist pin clip tool in piston and through block prior to engine assembly
 - ▶ Once wrist pin clips are installed, verify installation with a borescope, otherwise severe engine damage will occur if wrist pin clip is not properly installed in the piston clip groove.
- 10 Custom head gaskets available only from LN Engineering are required for larger than original bore sizes and thicknesses to correct the deck height.
- 11 **DO NOT USE SYNTHETIC OIL FOR ASSEMBLY OR BREAK IN. USE APPROPRIATE NON-SYNTHETIC BREAK-IN OILS AND ASSEMBLY LUBRICANTS. WE USE AND RECOMMEND DRIVEN PRODUCTS EXCLUSIVELY.**
- 12 New fuel injectors should be used. Fuel filter, if serviceable, must be replaced. 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.
- 13 Rebuilt engines should be fitted with the following new items: knock sensors, O2 sensors, MAF, AOS and oil fill tubes, oil and coolant fill caps, Genuine Porsche AOS and water pump. The engine must be smoke tested to ensure there are no vacuum leaks that can cause rich operation and damage the engine during break-in. Intermix engines including those with cracked cylinders or oil burners with scored cylinders should be fitted with new catalytic converters. Intermix engines need to have the cooling system properly cleaned and hoses replaced.
- 14 Proper engine oil system priming and break-in is critical. Do not turn over an M96 engine to build oil pressure – excessive cranking will cause rod bearing failure as the oil system will not prime at starter speeds. To prime the engine, start and immediately turn off the engine. Repeat start/stop until the gauge shows at least 2 bar of oil pressure. Once primed, break-in can commence. It is critical to verify fuel trims and AFR as overly rich mixtures during break-in will result in engine damage or failure.
- 15 Refer to <https://lnengineering.com/products/joe-gibbs-driven-racing-oils/driven-break-in-oils.html> for most current break-in recommendations.
Do not track any engine on break-in, intermediate or street oils. Do not use any semi- or full-synthetic oil or any oil with friction modifiers such as moly for the first 3000-5000 miles.

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.

This instruction manual or bulletin is not intended to be substituted for proper judgement, or common sense. Always refer to the factory manual or to the information supplied by the manufacturer with your product for detailed assembly or installation instructions.

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