MAHLE
Motorsport

PORSCHE APPLICATION GUIDE

2024
RACING COMPONENTS

POWERPAK

MAHLE MOTORSPORT

BUILD SOMETHING GREAT

In recent years, MAHLE Motorsport-powered vehicles have won multiple championships in everything from NASCAR, American Le Mans, World of Outlaws and SCORE Offroad to local circle track and drag strip championships across the country and everything else in between, not to mention capturing world records in the quarter mile and at the Salt Flats of Bonneville.

Tested and proven in top racing series around the world, MAHLE continues to demonstrate why we are the first name in high-performance racing pistons.

Our forged pistons are backed by 100+ years of MAHLE expertise and global technology. Our engineers are passionate about engines, obsessed with the details and committed to designing powerful pistons that handle maximum stress. That same passion is shared by the customer service, warehouse and production teams that are committed to helping you Build Something Great.

Whether you're racing recreationally, competing professionally or building engines for those who do, be part of the winning tradition of MAHLE Motorsport.

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THE POWERPAK

WHERE POWER AND DURABILITY COEXIST

The POWERPAK kit is the racer's best value. Developed for high-performance enthusiasts and engine builders who want uncompromising reliability, the POWERPAK delivers just that.

The forged piston kits are made from either 4032 aluminum alloy, which allows for tighter cylinder-to-wall clearances and improved temperature stability, or 2618 alloy, which adds strength and increased detonation resistance.

In addition to fully machined crowns and CNC machined pin bores, the pistons are dual coated with phosphate to reduce micro-welding and pin galling, and the skirt features a GRAFAL® anti-friction coating. Each set includes low-drag rings proven to increase horsepower and torque, clips and application-specific pins—all designed to ensure minimum friction and maximum horsepower.

POWERPAK

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Motorsport POWERPAK Piston Sets

MAHLE's relationship with Porsche dates back to Porsche's beginning. Together we have developed some of the best competition and sports car engines available throughout the last nine decades.

MAHLE Motorsport North America has taken the extensive experience gained from its relationship with Porsche to develop a series of performance and racing piston and cylinder kits. These kits were designed for high performance applications and are modern adaptations of the original or aftermarket kits; therefore there may be visual differences that are intentional and beneficial to the performance, durability and longevity of the components.

The pistons are machined from forgings with narrower and shorter skirts to reduce weight and friction. They are then dual coated, with phosphate and MAHLE's proprietary GRAFAL® skirt coating. The phosphate is a dry film lubricant designed to help protect the pin bores from galling and ring grooves from micro-welding. The GRAFAL® anti-friction skirt coating is designed to reduce drag, wear and noise.

The kits are supplied with modern ring sets made from stronger more durable materials that are dimensionally narrower and shorter to be more conformable providing more consistent contact with the cylinders resulting in increased sealing and oil control.

PORSCHE WATER-COOLED

Bore	Stroke	Rod	Comp Height	Pin Diam.	Crown Vol	Wght G	Compression Ratio	Alloy	Clearance Guide Meas.	Min	Max	Part No.
NOTE: All Water-cooled CR calculated at zero deck clearance and 1mm head gasket thickness												
PORSCHE 944 TURBO 2.5L for use in factory aluminum bores only												
1.2, 1.5, 3.0mm Performance Ring Set Included							**54cc**					
100.5mm	78.9mm	150mm	40.8mm	24mm	-21cc	473	8.6	2618	0.500	0.0020	0.0028	930070756 *
101.0mm						479	8.6					930070776 *
*Hard Anodized Top Ring Groove For Extreme Duty Applications												
PORSCHE 968 TURBO 3.0L for use in factory aluminum bores only												
1.2, 1.5, 3.0mm Performance Ring Set Included							**56cc**					
104.5mm	87.8mm	150mm	36mm	24mm	-32cc	501	8.8	2618	0.400	0.0020	0.0028	930130214 *
*Hard Anodized Top Ring Groove For Extreme Duty Applications												
PORSCHE Cayman 3.4L for use with replacement cast iron cylinder liner												
1.2, 1.5, 2.0mm Performance Ring Set Included							**39cc**					
96.0mm	78mm	144.98mm	32.35mm	22mm	-9.6cc	405	11.1	4032	0.500	0.0008	0.0016	197848980 *
*Hard Anodized Top Ring Groove												
PORSCHE Cayman 3.4L for use with replacement Nikasil cylinder liner												
1.2, 1.5, 2.0mm Performance Ring Set Included							**39cc**					
96.0mm	78mm	144.98mm	32.35mm	22mm	-9.6cc	405	11.1	4032	0.500	0.0008	0.0016	197849080 *
*Hard Anodized Top Ring Groove												
PORSCHE 996 3.6L for use with replacement cast iron cylinder liner												
1.2, 1.5, 2.0mm Performance Ring Set Included							**38cc**					
96.0mm	82.8mm	141.99mm	32.95mm	22mm	-13.3cc	407	11.3	4032	0.500	0.0008	0.0016	197849180 *
*Hard Anodized Top Ring Groove												
PORSCHE 996 3.6L for use with replacement Nikasil cylinder liner												
1.2, 1.5, 2.0mm Performance Ring Set Included							**38cc**					
96.0mm	82.8mm	141.99mm	32.95mm	22mm	-13.3cc	407	11.3	4032	0.500	0.0008	0.0016	197849280 *
*Hard Anodized Top Ring Groove												
PORSCHE 997 3.8L for use with replacement cast iron cylinder liner												
1.0, 1.0, 2.0mm Performance Ring Set Included							**38cc**					
99.0mm	82.8mm	141.99mm	32.95mm	22mm	-13.2cc	416	11.8	4032	0.500	0.0008	0.0016	197837098 *
100.0mm						423	12.0					197837037 *
*Hard Anodized Top Ring Groove												
PORSCHE 997 3.8L for use with replacement Nikasil cylinder liner												
1.0, 1.0, 2.0mm Performance Ring Set Included							**38cc**					
99.0mm	82.8mm	141.99mm	32.95mm	22mm	-13.2cc	416	11.8	4032	0.500	0.0008	0.0016	197846098 *
100.0mm						423	12.0					197846037 *
*Hard Anodized Top Ring Groove												
PORSCHE 991 3.8L Turbo (2014-2019) Box in Box												
1.2, 1.2, 3.0mm Performance Ring Set included							**63cc**					
102mm	77.5mm	138mm	33.95mm	23mm	-7.6cc	485	9.0	2618	0.550	0.0046	0.0054	197976416 *
*Hard Anodized Top Ring Groove												

PORSCHE 356 AIR-COOLED

Bore	Stroke	Rod	Comp Height	Pin Diam.	Crown Vol	Wght G	Compression Ratio		Alloy	Clearance Guide Meas.	Min	Max	Part No.	
NOTE: All Air-cooled CR calculated at 1mm below deck														
PORSCHE 356 - Slip-in cylinder case register (30° cylinder heads)														
1.2, 1.2, 2.8mm Performance Ring Set Included							**57.5cc**	**60.5cc**						
86.0mm	74mm	135.95mm	27.05mm	22mm	15.8cc	301	10.0	9.5	2618	0.250	0.0006	0.0014	PP86-003N	Piston (set)
*LN cylinders sold through LN distributors; Kit PN shown for reference only													LN 102-86 *	Cylinder (ea)
													PS86-003N *	Kit (set)
PORSCHE 356 - Slip-in cylinder case register (30° cylinder heads)														
1.2, 1.2, 2.8mm Performance Ring Set Included							**60.5cc**	**63.5cc**						
86.0mm	74mm	135.95mm	27.05mm	22mm	18.7cc	305	10.0	9.5	2618	0.250	0.0006	0.0014	PP86-004N	Piston (set)
*LN cylinders sold through LN distributors; Kit PN shown for reference only													LN 102-86 *	Cylinder (ea)
													PS86-004N *	Kit (set)
PORSCHE 356 - Slip-in cylinder case register (30° cylinder heads)														
1.2, 1.2, 2.8mm Performance Ring Set Included							**63.5cc**	**66.5cc**						
86.0mm	74mm	135.95mm	27.05mm	22mm	21.8cc	307	10.0	9.5	2618	0.250	0.0006	0.0014	PP86-005N	Piston (set)
*LN cylinders sold through LN distributors; Kit PN shown for reference only													LN 102-86 *	Cylinder (ea)
													PS86-005N *	Kit (set)
PORSCHE 356 - Machine-in 94.5mm cylinder case register (30° cylinder heads)														
1.2, 1.2, 2.8mm Performance Ring Set Included							**57.5cc**	**60.5cc**						
91.0mm	74mm	135.95mm	27.05mm	22mm	10.6cc	321	10.0	9.5	2618	0.250	0.0005	0.0013	PP91-001N	Piston (set)
*LN cylinders sold through LN distributors; Kit PN shown for reference only													LN 102-91 *	Cylinder (ea)
													PS91-001N *	Kit (set)
PORSCHE 356 - Machine-in 94.5mm cylinder case register (30° cylinder heads)														
1.2, 1.2, 2.8mm Performance Ring Set Included							**60.5cc**	**63.5cc**						
91.0mm	74mm	135.95mm	27.05mm	22mm	13.6cc	324	10.0	9.5	2618	0.250	0.0005	0.0013	PP91-002N	Piston (set)
*LN cylinders sold through LN distributors; Kit PN shown for reference only													LN 102-91 *	Cylinder (ea)
													PS91-002N *	Kit (set)
PORSCHE 356 - Machine-in 94.5mm cylinder case register (30° cylinder heads)														
1.2, 1.2, 2.8mm Performance Ring Set Included							**63.5cc**	**66.5cc**						
91.0mm	74mm	135.95mm	27.05mm	22mm	16.6cc	332	10.0	9.5	2618	0.250	0.0005	0.0013	PP91-003N	Piston (set)
*LN cylinders sold through LN distributors; Kit PN shown for reference only													LN 102-91 *	Cylinder (ea)
													PS91-003N *	Kit (set)

Motorsport Air-Cooled Cylinders

The cylinders included in Motorsport's air-cooled kits are produced and machined to original equipment tolerances, designed to provide increased performance, durability and longevity. Some applications are available as either a slip-in or machine-in design. The slip-in cylinders are simply a larger internal bore replacement. The machine-in cylinders require the engine cases to be machined to a larger bore diameter to accept their larger spigot diameter. The larger spigot diameter is preferable for extreme applications as with highly boosted turbo or competition-use engines.

MAHLE Motorsport has partnered with LN Engineering to broaden the range of available Porsche applications. The LN "Nickies" cyinders are manufactured from a different aluminum alloy than MAHLE cylinders. The MAHLE Motorsport pistons designed to work with LN liners are manufactured from the compatible alloy and designed specifically for use with LN liners, offering the same performance, durability and longevity.

PORSCHE 2.0L / 2.2L / 2.4L / 2.7L AIR-COOLED

Bore	Stroke	Rod	Comp Height	Pin Diam.	Crown Vol	Wght G	Compression Ratio	Alloy	Clearance Guide Meas.	Min	Max	Part No.	
NOTE: All Air-cooled CR calculated at 1mm below deck													
PORSCHE 911 and 911S 2.0L (1964-1969)													
1.2, 1.2, 2.0mm Performance Ring Set Included							**70.5cc**						
80.0mm	66mm	130mm	34mm	22mm	38.8cc	334	10.0	4032	0.250	0.0010	0.0018	PP80-001	Piston (set)
												PC80-001	Cylinder (ea)
												PS80-001	Kit (set)
Porsche 911 2.0L Cup													
1.2, 1.2, 2.0mm Performance Ring Set included							**70.5cc**						
80.0mm	66mm	130mm	34mm	22mm	40cc	337	10.3	4032	0.250	0.0010	0.0018	PP80-002	Piston (set)
												PC80-001	Cylinder (ea)
												PS80-002	Kit (set)
PORSCHE 911 and 911S 2.2L (1970-1971)													
1.2, 1.2, 2.0mm Performance Ring Set Included							**70.5cc**						
84.0mm	66mm	130mm	34mm	22mm	27.2cc	370	8.5	4032	0.250	0.0010	0.0018	PP84-001	Piston (set)
												PC84-001	Cylinder (ea)
												PS84-001	Kit (set)
PORSCHE 911 and 911S 2.4L (1972-1973)													
1.2, 1.2, 2.0mm Performance Ring Set Included							**70.5cc**						
84.0mm	70.4mm	130mm	34mm	22mm	27.2cc	370	9.0	4032	0.250	0.0010	0.0018	PP84-001	Piston (set)
												PC84-001	Cylinder (ea)
												PS84-001	Kit (set)
PORSCHE 911S 2.5L Long Stroke													
1.2, 1.2, 2.0mm Performance Ring Set Included							**70.5cc**						
86.7mm	70.4mm	127.8mm	34mm	22mm	26.0cc	387	9.2	2618	0.250	0.0010	0.0018	PP86-002N	Piston (set)
*LN cylinders sold through LN distributors; Kit PN show for reference only												LN 103-86.7 *	Cylinder (ea)
												PS86-002N *	Kit (set)
PORSCHE 911S 2.5L Short Stroke													
1.2, 1.5, 3.0mm Performance Ring Set included							**68cc**						
89.0mm	66mm	130mm	33.9mm	22mm	30.2cc	420	10.2	2618	0.250	0.0009	0.0017	PP89-002N	Piston (set)
*LN cylinders sold through LN distributors; Kit PN shown for reference only												LN 103-89 *	Cylinder (ea)
												PS89-002N *	Kit (set)
PORSCHE 911 2.7L (1973-1977) Carb or Mechanical Injection													
1.2, 1.5, 3.0mm Performance Ring Set included							**68cc**						
90.0mm	70.4mm	127.8mm	34mm	22mm	26.1cc	402	10.3	2618	0.500	0.0009	0.0017	PP90-003N	Piston (set)
*LN cylinders sold through LN distributors; Kit PN shown for reference only												LN 103-90 *	Cylinder (ea)
												PS90-003N *	Kit (set)
PORSCHE 911 2.7L to 2.8L (1973-1977) Carb or Mechanical Injection													
1.2, 1.5, 3.0mm Performance Ring Set Included							**68cc**						
92.0mm	70.4mm	127.8mm	33.9mm	22mm	21.5cc	425	9.8	2618	0.400	0.0009	0.0017	PP92-004N	Piston (set)
*LN cylinders sold through LN distributors; Kit PN shown for reference only												LN 103-92 *	Cylinder (ea)
												PS92-004N *	Kit (set)
PORSCHE 911 2.7L to 2.9L (1973-1977) Carb or Mechanical Injection													
1.2, 1.5, 3.0mm Performance Ring Set Included							**68cc**						
93.0mm	70.4mm	127.8mm	33.9mm	22mm	23.4cc	440	10.3	2618	0.400	0.0010	0.0018	PP93-004N	Piston (set)
*LN cylinders sold through LN distributors; Kit PN shown for reference only												LN 103-93 *	Cylinder (ea)
												PS93-004N *	Kit (set)

PORSCHE 3.0L / 3.2L / 3.3L AIR-COOLED

Bore	Stroke	Rod	Comp Height	Pin Diam.	Crown Vol	Wght G	Compression Ratio	Alloy	Clearance Guide Meas.	Min	Max	Part No.	
NOTE: All Air-cooled CR calculated at 1mm below deck													
PORSCHE 930 TURBO 3.3L to 3.4L (1978-1992)													
1.2, 1.2, 3.0mm Performance Ring Set Included							**90cc**						
98.0mm	74.4mm	127mm	32.8mm	23mm	14.2cc	436	7.7	4032	0.250	0.0010	0.0018	PP98-012	Piston (set)
												PC98-001	Cylinder (ea)
												PS98-009	Kit (set)
PORSCHE 911 CARRERA 3.2L to 3.4L (1984-1989) Motronic Inj													
1.2, 1.2, 3.0mm Performance Ring Set Included							**90cc**						
98.0mm	74.4mm	127mm	32.8mm	23mm	35.8cc	507	10.1	2618	0.250	0.0006	0.0014	PP98-013	Piston (set)
												PC98-001	Cylinder (ea)
												PS98-010	Kit (set)
PORSCHE 911 3.0L to 3.2L (1976-1983) Carb or Mechanical Injection													
1.2, 1.2, 3.0mm Performance Ring Set Included							**90cc**						
98.0mm	70.4mm	127.8mm	33.7mm	22mm	40cc	500	10.2	2618	0.250	0.0006	0.0014	PP98-014	Piston (set)
												PC98-001	Cylinder (ea)
												PS98-014	Kit (set)
PORSCHE 911 3.0L to 3.2L (1976-1983) Motronic Inj.													
1.2, 1.2, 3.0mm Performance Ring Set Included							**90cc**						
98.0mm	70.4mm	127.8mm	34mm	22mm	38.5cc	494	10.0	2618	0.250	0.0006	0.0014	PP98-015	Piston (set)
												PC98-001	Cylinder (ea)
												PS98-015	Kit (set)
PORSCHE 930 TURBO 3.0L to 3.2L (1975-1977)													
1.2, 1.2, 3.0mm Performance Ring Set Included							**90cc**						
98.0mm	70.4mm	127.8mm	33.7mm	22mm	15.8cc	419	7.5	4032	0.250	0.0010	0.0018	PP98-016	Piston (set)
												PC98-001	Cylinder (ea)
												PS98-016	Kit (set)
PORSCHE 911 CARRERA 3.2L to 3.4L (1984-1989)													
1.2, 1.2, 3.0mm Performance Ring Set Included													
Compatible with dual plug cylinder heads and high lift cams (DC80)							**92cc**						
98.00mm	74.4mm	127mm	32.8mm	23mm	43.2cc	457	11.0	2618	0.250	0.0006	0.0014	PP98-017	Piston (set)
												PC98-001	Cylinder (ea)
												PS98-017	Kit (set)
PORSCHE 911 3.2L to 3.5L (1984-1989) - Machine-in 105mm cylinder case register													
1.2, 1.5, 3.0mm Performance Ring Set Included							**90cc**						
100.0mm	74.4mm	127mm	32.8mm	23mm	35cc	473	10.3	2618	0.500	0.0010	0.0018	PP100-009N	Piston (set)
*LN cylinders sold through LN distributors; Kit PN shown for reference only												LN 103-100/105 *	Cylinder (ea)
												PS100-009N *	Kit (set)
PORSCHE 911 3.3L to 3.5L 930T (1978-1992) - Machine-in Ø105mm cylinder case register													
1.2, 1.5, 3.0mm Performance Ring Set Included							**90cc**						
100.0mm	74.4mm	127mm	32.8mm	23mm	0.5cc	428	7.0	2618	0.250	0.0010	0.0018	PP100-010N **	Piston (set)
*LN cylinders sold through LN distributors; Kit PN shown for reference only												LN 103-100/105 *	Cylinder (ea)
**Hard Anodized Top Ring Groove For Extreme Duty Applications												PS100-010N *	Kit (set)
PORSCHE 911 3.0L to 3.3L CIS Inj. (1976-1983) - Machine-in Ø105mm cylinder case register													
1.2, 1.5, 3.0mm Performance Ring Set Included							**90cc**						
100.0mm	70.4mm	127.8mm	34mm	22mm	35cc	474	9.8	2618	0.250	0.0010	0.0018	PP100-011N	Piston (set)
*LN cylinders sold through LN distributors; Kit PN shown for reference only												LN 103-100/105 *	Cylinder (ea)
												PS100-010N *	Kit (set)

PORSCHE 3.6L AIR-COOLED

Bore	Stroke	Rod	Comp Height	Pin Diam.	Crown Vol	Wght G	Compression Ratio	Alloy	Clearance Guide Meas.	Min	Max	Part No.	
NOTE: All Air-cooled CR calculated at 1mm below deck													
PORSCHE 964 NA 3.6L to 3.8L (also fits 993) (1989-1998) - Slip-in Ø107mm cylinder case register													
1.2, 1.2, 3.0mm Performance Ring Set Included							**90cc**						
102.0mm	76.4mm	127mm	31.5mm	23mm	44.5cc	474	12.6	4032	0.315	0.0010	0.0018	PP102-011	Piston (set)
												PC102-002	Cylinder (ea)
												PS102-017	Kit (set)
PORSCHE 964 NA 3.6L to 3.8L (also fits 993) (1989-1998) - Machine-in Ø109mm cylinder case register													
1.2, 1.2, 3.0mm Performance Ring Set Included							**90cc**						
102.0mm	76.4mm	127mm	31.5mm	23mm	44.5cc	474	12.6	4032	0.315	0.0010	0.0018	PP102-011	Piston (set)
												PC102-001	Cylinder (ea)
												PS102-018	Kit (set)
PORSCHE 993 TURBO 3.6L to 3.8L - Machine-in Ø109mm cylinder case register, shorter 114.5mm tall cylinder													
1.2, 1.2, 3.0mm Performance Ring Set Included							**90cc**						
102.0mm	76.4mm	127mm	31.8mm	23mm	9.6cc	468	8.0	2618	0.590	0.0010	0.0018	PP102-012N	Piston (set)
*LN cylinders sold through LN distributors; Kit PN show for reference only												LN 105-102/109 *	Cylinder (ea)
												PS102-012N *	Kit (set)
PORSCHE 964 TURBO (& 993 Carerra to Turbo conversion) 3.6L to 3.8L - Slip-in Ø107mm cylinder case register													
1.2, 1.2, 3.0mm Performance Ring Set Included							**90cc**						
102.0mm	76.4mm	127mm	31.8mm	23mm	22.6cc	453	9.3	4032	0.470	0.0010	0.0018	PP102-013	Piston (set)
												PC102-002	Cylinder (ea)
												PS102-020	Kit (set)
PORSCHE 964 TURBO (& 993 Carrera to Turbo conversion) 3.6L to 3.8L - Machine-in Ø109mm cylinder case register													
1.2, 1.2, 3.0mm Performance Ring Set Included							**90cc**						
102.0mm	76.4mm	127mm	31.8mm	23mm	22.6cc	453	9.3	4032	0.470	0.0010	0.0018	PP102-013	Piston (set)
												PC102-001	Cylinder (ea)
												PS102-021	Kit (set)
PORSCHE 993 RSR style 3.6L to 3.8L (also fits 964) (1989-1998) - Slip-in Ø107mm cylinder case register													
1.2, 1.2, 3.0mm Performance Ring Set Included							**90cc**						
102.0mm	76.4mm	127mm	31.5mm	23mm	38.1cc	489	11.4	4032	0.315	0.0010	0.0018	PP102-014	Piston (set)
												PC102-002	Cylinder (ea)
												PS102-022	Kit (set)
PORSCHE 993 RSR style 3.6L to 3.8L (also fits 964) (1989-1998) - Machine-in Ø109mm cylinder case register													
1.2, 1.2, 3.0mm Performance Ring Set Included							**90cc**						
102.0mm	76.4mm	127mm	31.5mm	23mm	38.1cc	489	11.4	4032	0.315	0.0010	0.0018	PP102-014	Piston (set)
												PC102-001	Cylinder (ea)
												PS102-023	Kit (set)
PORSCHE 964 / 993 Stroker 3.6L to 3.9L - Slip-in Ø107mm cylinder case register													
1.2, 1.2, 3.0mm Performance Ring Set Included							**90cc**						
102.0mm	80.4mm	127mm	29.5mm	23mm	35.0cc	480	11.4	4032	0.500	0.0010	0.0018	PP102-015	Piston (set)
												PC102-002	Cylinder (ea)
												PS102-024	Kit (set)
PORSCHE 964 / 993 Stroker 3.6L to 3.9L - Machine-in Ø109mm cylinder case register													
1.2, 1.2, 3.0mm Performance Ring Set Included							**90cc**						
102.0mm	80.4mm	127mm	29.5mm	23mm	35.0cc	480	11.4	4032	0.500	0.0010	0.0018	PP102-015	Piston (set)
												PC102-001	Cylinder (ea)
												PS102-025	Kit (set)
PORSCHE 964 / 993 3.6L to 3.9L (1989-1998) - Machine-in Ø109mm cylinder case register													
1.2, 1.5, 3.0mm Performance Ring Set Included							**90cc**						
104.0mm	76.4mm	127mm	31.8mm	23mm	36.2cc	528	11.4	2618	0.500	0.0011	0.0019	PP104-001N	Piston (set)
*LN cylinders sold through LN distributors; Kit PN shown for reference only												LN 104-104 *	Cylinder (ea)
												PS104-001N *	Kit (set)

Porsche Ring Sets, Pins, & Clips

Finish Bore	Description	Set Part Number
	Porsche Ring Sets	
80.00 mm	1.2, 1.2, 2.0mm File Fit (6cyl)	PR80MS-12
84.00 mm	1.2, 1.2, 2.0mm File Fit (6cyl)	PR84MS-12
86.70 mm	1.2, 1.2, 2.0mm File Fit (6cyl)	PR86MS-12
89.00 mm	1.2, 1.5, 3.0mm File Fit (6cyl)	PR89MS
90.00 mm	1.2, 1.5, 3.0mm File Fit (6cyl)	PR90MS
92.00 mm	1.2, 1.5, 3.0mm File Fit (6cyl)	PR92MS
93.00 mm	1.2, 1.5, 3.0mm File Fit (6cyl)	PR93MS
95.00 mm	1.2, 1.5, 3.0mm File Fit (6cyl)	PR95MS
98.00 mm	1.2, 1.5, 3.0mm File Fit (6cyl)	PR98MS
98.00 mm	1.2, 1.2, 3.0mm File Fit (6cyl)	PR98MS-12
100.00 mm	1.2, 1.5, 3.0mm File Fit (6cyl)	PR100MS
102.00 mm	1.2, 1.2, 3.0mm File Fit (6cyl)	PR102MS-12
102.00 mm	1.46, 1.46, 2.99mm File Fit (6cyl)	PR102MS-15
104.00 mm	1.2, 1.5, 3.0mm File Fit (6cyl)	PR104MS
86.00 mm	1.2, 1.2, 2.8mm Drop In (4cyl)	8600MS-12
91.00 mm	1.2, 1.2, 2.8mm File Fit (4cyl)	1978643
91.00 mm	1.2, 1.2, 2.8mm File Fit (4cyl) NIKASIL	1979977
96.00 mm	1.2, 1.5, 2.0mm File Fit (6cyl) NIKASIL	1978504
96.00 mm	1.2, 1.5, 2.0mm File Fit (6cyl)	1978505
99.00 mm	1.0, 1.0, 2.0mm File Fit (1cyl)	3903MS-112-1
100.00 mm	1.0, 1.0, 2.0mm File Fit (1cyl)	3942MS-112-1
101.00 mm	1.2, 1.5, 3.0mm File Fit (4cyl)	9300402
100.50 mm	1.2, 1.5, 3.0mm File Fit (4cyl) ALUSIL	1977212
104.50 mm	1.2, 1.5, 3.0mm File Fit (4cyl)	9300400

Description	Set Part Number
Piston Pins	
Piston Pins	
22 x 12/15.7 x 52mm Taper CH 101g	9894428
22 x 13 x 58.11mm CH 112g	9900106
23 x 13 x 50mm Taper R 98g	4394409
22 x 13 x 52mm CH 101g	1979122
23 x 13.0 x 57.404mm R H13 129g	1977408
23 x 13.5 x 55.6mm CH 119g	9299621
23 x 13.5 x 57.404mm R 124g	9298392
23 x 13.9 x 63.5mm CH 131g	9301712
24 x 15 x 58.1mm CH 125g	9900079
Clips (each) w/o tang	
22mm x 1.6mm Round Wire Lock	2042968
23mm x 1.6mm Round Wire Lock	9315805
24mm x 1.6mm Round Wire Lock	9900539

Final Assembly Tech Tips

Compression Ratio

The compression ratio shown in the application guide is calculated at 1mm (0.040”) deck clearance for Air-Cooled applications. For Water-Cooled at zero deck clearance and a 1mm head gasket thickness. The compression ratio of your specific application will vary depending on the deck clearance that the engine is built with.

Piston Ring Gaps

The rings should be checked in the cylinder to ensure that the end gaps are sufficient. Recommendations and additional information is provided in the ring instructions located on page 8. Should you require additional ring end gap, the rings should be gapped before installation on the piston.

Piston Orientation In Engine

For pistons that have an arrow laser etched on the crown, the pistons are installed so that the arrow points toward the flywheel.
For pistons with slanted dome and symmetric valve pockets, the pistons are installed so that the short end of the dome is located under the spark plug.

Piston to Valve Clearance

Valve to piston clearance depends on many factors; including the piston crown configuration, valve train and camshaft characteristics, and cylinder head design. The camshaft manufacturer can supply the minimum recommended valve to piston clearance for your specific camshaft/valve train combination. After the camshaft is “degreed” correctly you may check the valve clearance using either modeling clay or light spring method. Minimum recommended clearance for valve face to valve pocket floor of the piston is 0.080” for the intake valve, and 0.100” for the exhaust valve. Minimum radial clearance is 0.050” radially for all valves.

NOTICE: Be sure to check the clearances of MAHLE pistons in relation to other engine components such as valves, connecting rods, and oil squirters BEFORE running the engine. These components may need adjustment in order to function properly with MAHLE pistons.

Piston to Cylinder Wall Clearance

MAHLE machines the proper piston to cylinder wall clearance into every piston and cylinder kit.

The recommended piston to cylinder wall measurement and location is listed on the outside label of the box. The piston measurement location is measured up from the bottom of the piston skirt. For the cylinder, the measurement location is measured down from the top of the cylinder. The cylinder should be measured in the same axis as the pistons (thrust / anti-thrust). It is worth noting that the piston to wall clearance value specified is measured over the Grafal® skirt coating.

Tech Note

Prior to final engine assembly, the top, bottom, and face of each ring plus the cylinder bore should be lightly coated with clean, light-weight, conventional motor oil. DO NOT dip the entire piston as this may lead to improper seating of the rings.

Additional tech information and informative technical videos covering the above points are located on our website as well as the MAHLE Motorsport YouTube channel.

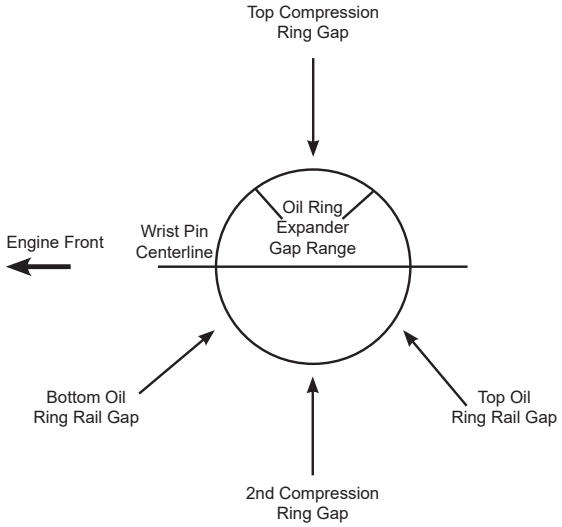
Ring Gap Instructions

Application	Top Ring (minimum)	Second Ring (minimum)	Oil Ring Rail	4.000 Bore Example Top, 2nd, Oil Rails
High Performance Street - NA	Bore x 0.0045"	Bore x 0.0050"	Min 0.015"	0.018", 0.020", Min 0.015"
Circle Track, Drag Racing - NA	Bore x 0.0050"	Bore x 0.0060"	Min 0.015"	0.020", 0.024", Min 0.015"
Nitrous up to 200hp (25HP/cyl)	Bore x 0.0060"	Bore x 0.0060"	Min 0.015"	0.024", 0.024", Min 0.015"
Nitrous Race 200hp+ (25HP/cyl)	Bore x 0.0070"	Bore x 0.0070"	Min 0.015"	0.028", 0.028", Min 0.015"
Turbo / Supercharger	Bore x 0.0060"	Bore x 0.0060"	Min 0.015"	0.024", 0.024", Min 0.015"
Turbo / Supercharger Race	Bore x 0.0070"	Bore x 0.0070"	Min 0.015"	0.028", 0.028", Min 0.015"
Diesel - Turbocharged	Bore x 0.0060"	Bore x 0.0055"	Min 0.015"	0.024", 0.022", Min 0.015"

NOTE: The second ring gap recommendations have continued to change over the years. Current recommendations are such that the 2nd ring gap is larger than the top rings for most applications. Testing has proven that a larger second ring gap increases the top ring's stability allowing for a better seal. This larger "escape" path prevents inter-ring pressure from building up and lifting the top ring off the piston allowing combustion to get by. Many engine builders have reported lower blow-by and horsepower gains at the upper RPM ranges with the wider second ring gaps. Also, almost every new car made is using this inter-ring pressure reduction method to lower blow-by and emissions and to increase engine output. Additionally, and for these reasons , these ring gap recommendations are to be considered minimums, and some kits will come with larger gaps than the minimum listed in the table directly out of the box.

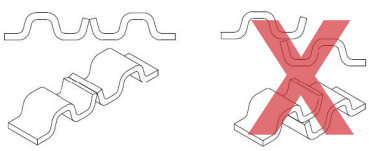
PROPER RING INSTALLATION

Top ring: If there is a dot (pip mark) or a laser etching (commonly etched as "TOP" or the MAHLE logo, or a number designator) on one of the flats of the top ring, this marking is indicating the top of the ring. Typically, if there is a bevel on the ID of the top ring, the bevel should be facing up toward the top of the piston.



2nd Ring: I If there is a dot (pip mark) or a laser etching (commonly etched as "TOP" or the MAHLE logo, or a number designator) on one of the flats of the top ring, this marking is indicating the top of the ring. Typically, if there is a bevel on the ID of the 2nd ring, the bevel should be facing down toward the bottom of the piston. Any marking indicating the top of the piston ring supersedes the location of the ID bevel of the ring.

Oil Ring - may be either 2 piece or 3 piece design:
2 Piece Instructions: Remove the coil spring from the oil ring and place the coil spring in the groove, noting the location of the coil spring joint. Install the oil ring in the ring groove; the oil ring gap must be assembled opposite (180 degrees) to coil spring joint.
3 Piece Instructions: Place the expander in the groove, ensure the ends are butted against each other. Position the expander ends in the desired orientation on the piston, an image of the recommended installation location is provided in the Proper Ring Alignment section. Install the lower steel ring, the ring end gap must be approximately 90° to 120° left from the expander edges. Install the upper steel ring observing the same distance for the right side. After ring installation, check if oil ring set can move freely without binding. Important: expander ends must not overlap.



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