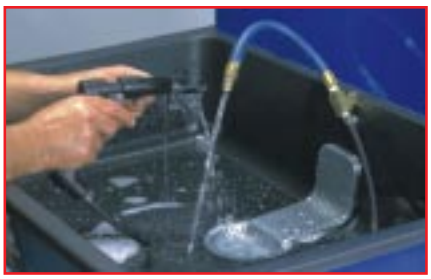
HOW TO: INSTALL CAP-STYLE ROD BOLTS

Replace your original connecting rod cap screws with these ARP items for enhanced durability and improved strength. Use whenever cap screw-style bolts are used for rod cap retention.



1. Clean and inspect all hardware for obvious damage. If necessary, chase or re-tap con rod threads to ensure proper thread engagement and accurate torque readings.

2. Position washer under bolt head to ensure it clears the under head radius. NOTE: Improper installation will cause premature bolt failure.

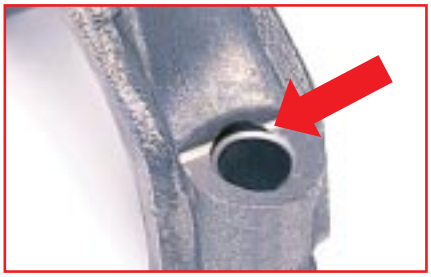
3. Assemble cap to rod, then lubricate with ARP Moly lube and install bolt & washer. Measure pre-torqued bolt length. You should keep a log of the original free standing length. A sample is on page 12.

4. Using a stretch gauge or micrometer to measure fastener stretch, torque rod bolt until recommended bolt stretch is achieved. A rod bolt stretch chart is on page 13.

5. Once properly pre-loaded, have the rods resized before assembling them to the pistons, then install in engine using the prescribed bolt-stretch method.

HOW TO: INSTALL OEM-STYLE ROD BOLTS

Improved reliability and optimum strength are the main attributes of ARP's replacement rod bolts. These are the finest fasteners available today, and are recommended for all high performance applications.



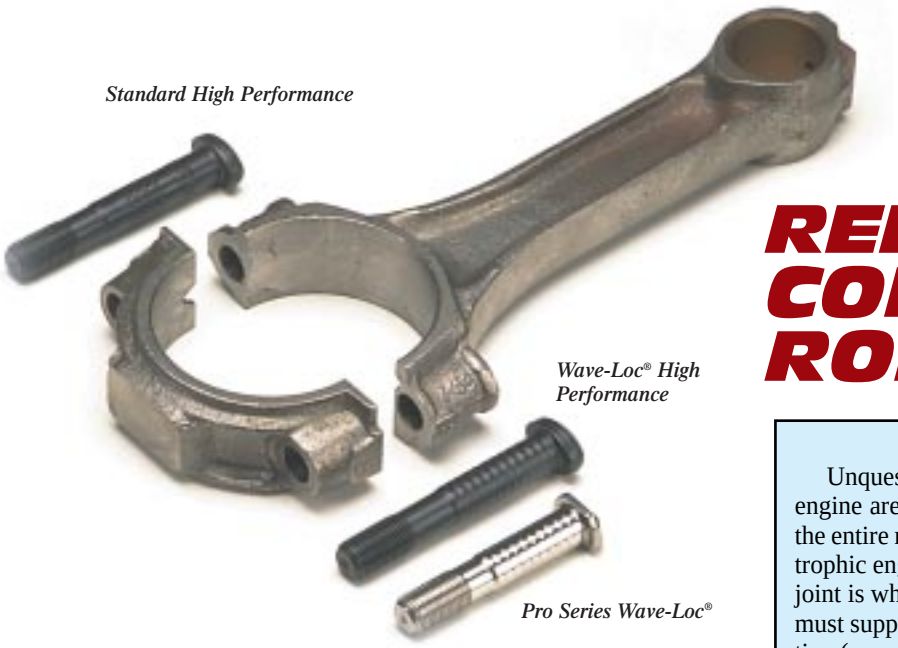
1. Inspect rods to ensure there is adequate chamfer to clear radius under heads, then install bolts after inspecting for damaged hardware.

2. Reinstall the rod cap, then measure bolt length using a micrometer (free standing length).

3. Lubricate rod nuts with ARP Moly lube, torque nuts to achieve recommended bolt stretch. A rod bolt stretch chart is located on page 13.

4. With proper pre-load applied, have rods resized. This procedure is recommended any time rod bolts are replaced.

5. Install rod and piston assemblies in engine using the prescribed bolt stretch method or by following recommended torque values.



Standard High Performance

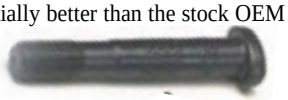
Wave-Loc® High Performance

Pro Series Wave-Loc®

REPLACEMENT CONNECTING ROD BOLTS

Choose From Three ARP Replacement Rod Bolts:

Because factory connecting rods (or aftermarket versions of OEM rods) are used in a variety of applications from rebuilt stock motors to modified powerplants used in circle track, marine and drag racing engines—including those with superchargers and/or nitrous oxide injection systems— ARP offers replacement rod bolts in three different models. All of them are substantially better than the stock OEM and most aftermarket bolts.



GOOD: STANDARD HIGH PERFORMANCE BOLTS

A premium grade 8740 alloy chrome moly steel is used to manufacture ARP High Performance connecting rod bolts. This material is heat treated to provide a tensile strength in the 190,000 psi range, which is substantially stronger the the OEM bolts. Cycle testing shows ARP High Performance rod bolts to be nearly five times more reliable than stock bolts.

BETTER: WAVE-LOC® HIGH PERFORMANCE BOLTS

The same heat-treated 8740 chrome moly steel is used to make these rod bolts as ARP's standard High Performance rod bolts. The big difference is in the shank design, with ARP's exclusive (and patented) Wave-Loc® technology providing substantial benefits. Because there are fairly wide tolerances in factory bolt holes, the bolt must be able to fit snugly and a knurl is applied. Unfortunately, these knurls cut deep into the bolt material, leaving sharp edges and enormous "stress risers" that promote failure. That's why ARP developed the Wave-Loc® design that features symmetrical waves and has an effective interference range of .0005" to .007" for proper cap alignment.

BEST: PRO SERIES WAVE-LOC BOLTS

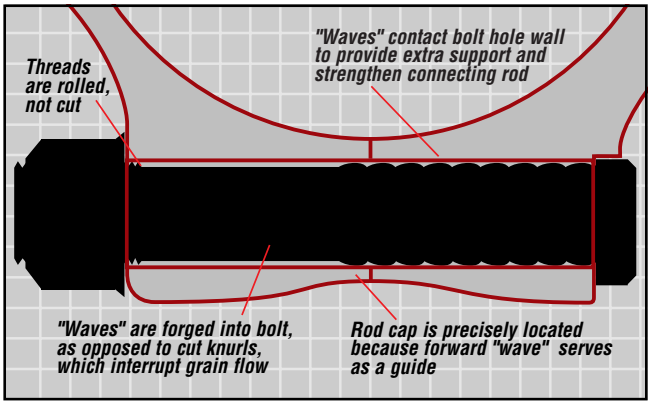
For the most severe applications, in conjunction with aftermarket I-beam rods, ARP has developed the "Pro" Series Wave-Loc® bolts. These ultra heavy-duty rod bolts are made from a special material designated ARP2000. It has approximately 200% the fatigue life of 8740 chrome moly steel and has a tensile strength of about **220,000 psi**, and is capable of more than 12,000 lbs. clamping force.

TECH NOTE: ROD BOLTS

Unquestionably the most important fasteners in any engine are the connecting rod bolts, as they hold the key to the entire rotating assembly. A broken bolt will lead to catastrophic engine failure. As you can imagine, the most critical joint is where the connecting rod halves mate. The rod bolts must support the primary tension loads caused by each rotation (or cycle) of the crankshaft. When the crank rotates, the big end of the connecting rod essentially becomes oval-shaped and the rod bolts bend. As the crankshaft continues to rotate, the rod becomes round again. With alternating tension loads and cyclic bending of the bolts, it is very important to install fasteners that are able to exert a clamping force greater than the load imposed upon the joint (tension).

In addition to utilizing a rod bolt with sufficient strength to withstand the tremendous cyclical strains placed upon it, it is absolutely imperative that the bolts be properly tightened. The preferred method of monitoring the correct amount of tension is through use of a stretch gauge. This is far more accurate than using a torque wrench. Moreover, through subsequently checking the rod bolt's length at tear-downs, it is possible to determine if it has been stressed beyond safe limits and must be replaced.

ADVANTAGES OF WAVE-LOC® ROD BOLTS:



- Wave-Loc® surface contacts the rod and cap for optimum alignment and reduction of fluctuating stress—which strengthens the rod itself!
- Provides snug fit for all OEM connecting rods (interference range of .0005" to .007"), despite wide range of factory rod bolt hole tolerances.
- Available for most applications.
- Superior material grain flow because of patented Wave-Loc® surface design as compared to knurled bolts that have sharp edges and "built in" stress risers.
- Galling and scoring of the rod is virtually eliminated because there is only smooth contact and absolutely no "digging."

Application	Head Style	Hi-Perf 8740 *(complete)*	Hi-Perf 8740 *(2-PC)*	HP Wave 8740 *(complete)*	HP Wave 8740 *(2-PC)*	Pro Wave ARP2000 *(complete)*	Pro Wave ARP2000 *(2-PC)*
AMC							
290-343-360 c.i.d. 11/32"	D	114-6001					
390-401 c.i.d., '68 to present, 3/8"	D	114-6002					
304 c.i.d.	D	114-6003					
258 c.i.d. 6-cylinder	D	112-6001					
BMC/TRIUMPH							
A-Series, 3/8"	J	206-6001					
A&B Series, 11/32"	C	206-6002					
B-Series, cap screw, 3/8", '64-'68, 18GB, 18GF	E	206-6003					
Spitfire	E	206-6004					
TR6	E	206-6005					
TR7	E	206-6006					
BMW							
2002, 320i	E	201-6101					
BUICK							
90° (cap screw type) 1.500" U.H.L.	E	123-6001	123-6021				
90° (cap screw type) 1.700" U.H.L.	E	123-6002	123-6022				
215 c.i.d. V8, aluminum	D	124-6001					
455-430-400-401-425 c.i.d.	B	125-6001					
CHEVROLET, SMALL BLOCK							
283-327 c.i.d. and inline 6	D	134-6001	134-6021	134-6401	134-6411	234-6401	234-6421
400 c.i.d.	A	134-6002	134-6022	134-6402	134-6422	234-6402	234-6422
305-307-350 c.i.d.	B	134-6003	134-6023	134-6403	134-6423	234-6403	234-6423
350 c.i.d. PM Rod 96 LTI/LT	B	134-6005					
CHEVROLET, BIG BLOCK							
396-427 c.i.d. 3/8"	A	135-6002	135-6022	135-6402	135-6422	235-6402	235-6422
454 & 502 c.i.d. 7/16"	A	135-6001	135-6021	135-6401	135-6421	235-6401	235-6421
409 c.i.d.	B	134-6003	134-6023	134-6403	134-6423	234-6403	234-6423
CHEVROLET, 4 and 6-CYLINDER							
V6, 2.8L 60°	D	133-6002	133-6022				
V6, 4.3L 90°	A	133-6001	133-6021				
Inline 6, 194 c.i.d.	D	132-6001	132-6021				
Vega 4-cylinder	D	131-6001	131-6021				
Corvair, 5/16"	D	132-6002	132-6022				
CHRYSLER							
318-340-360 c.i.d.	D	144-6001	144-6021	144-6401	144-6422	244-6401	244-6421
383-440 wedge, 354-392 Hemi 413	M	145-6002	145-6022			245-6402	245-6422
426 late Hemi, 7/16"	M	145-6001	145-6021				
6-cylinder, 170-225 c.i.d.	F	142-6001					
4-cylinder, 2.2L	D	141-6001					
FORD, SMALL BLOCK							
272/292 Y Block	M	154-6005					
Boss 302 & 351W	C	150-6004	150-6024	150-6404	150-6424	250-6404	250-6424
351-400M	C	154-6001	154-6021				
289-302 standard 5/16"	B	154-6002	154-6022	154-6402	154-6422	254-6402	254-6422
351 Cleveland	C	154-6003	154-6023	154-6403	154-6423	254-6403	254-6423
302 c.i.d. Sportsman SVO	C	150-6005	150-6025				
312 c.i.d.	C	154-6004					
FORD, BIG BLOCK							
428 Cobra Jet ①	A	155-6001	155-6021				
390-428 c.i.d.	G	155-6002	155-6022			255-6402	255-6422
Boss, 429-460 c.i.d.	C	150-6004	150-6024	150-6404	150-6424	250-6404	250-6424
429-460 c.i.d.	M	155-6003	155-6023				

Application	Head Style	Hi-Perf 8740 *(complete)*	Hi-Perf 8740 *(2-PC)*	HP Wave 8740 *(complete)*	HP Wave 8740 *(2-PC)*	Pro Wave ARP2000 *(complete)*	Pro Wave ARP2000 *(2-PC)*
FORD, 4 and 6-CYLINDER							
Pinto 2000cc inline 4	D	151-6001	151-6021				
Pinto 2300cc inline 4	F	151-6002	151-6022			251-6402	251-6422
CVH M8X1.0	E	151-6004					
Zetec, 1.6L	E	151-6003	151-6023				
Zetec, 2.0L						251-6201	251-6222
Inline 6, 240-300 c.i.d.	G	152-6001					
Inline 6, 4.9L	C	152-6002					
V6, 2.8L and 2.9L	B	153-6001					
HOLDEN							
308 V8	B	205-6001					
HONDA							
1.2L to 1.6L, 8mm	A	208-6001					
1.8L, 9mm	C					208-6401	
MITSUBISHI							
4G63, pre 1994, 9mm, 2-Pc	C	107-6001	107-6021				
4G63, 1994-present, 8mm	C	107-6002	107-6022				
2.6L	C	107-6003	107-6023				
3.0L V6, 3.5 V6 6674	C	107-6004	107-6024				
NISSAN							
L16 Series	C	102-6001					
L20 Series, 4-cylinder	C	202-6001					
L24 (early), 8mm	C	202-6002					
L24 (late), L26, L28 6-cylinder, 9mm,							
VG30E & VG30ET	C	202-6003					
VG30 V6 D (Four Cam), DET, DETT	C	202-6004					
OLDSMOBILE							
307-350-403-425 c.i.d. (small block)	A	184-6001	184-6021				
455 c.i.d. (big block)	F	185-6001	185-6021				
OPEL/VAUXHALL							
2.0L, 16-valve	E	109-6001				209-6003*	
1.4-1.6L 8-valve	E	109-6002					
PONTIAC							
326-389-400-455 c.i.d. (3/8"), '63 to present	I	190-6001	190-6021				
V8, 1955-62	D	190-6002	190-6022				
455 c.i.d. Super Duty, 7/16"	M	190-6003	190-6023				
4-cylinder "Iron Duke"	D	191-6001					
301 c.i.d.	D	194-6001					
455 c.i.d. Super Duty cap screw type, 7/16-24	E	190-6004					
PORSCHE							
911, 9mm, Turbo 930 & 993	C					204-6005	
911, 10mm	H					204-6001	
944	K					204-6002	
Type IV, 1.7L and 2.0L	K	104-6006					
TOYOTA							
4AGE, 9mm	A	203-6001					
22R	A	203-6002					
2TC, 3TC, 2TG	A	203-6003					
Supra, 7MGTE	A	203-6004					
VOLKSWAGEN							
1600cc air cooled	K	104-6001					
Corrado G60 & 1600cc water cooled Rabbit	K	104-6002					
Cap screw Super Vee (Audi style rod)	A			104-6003	104-6023		
2L & 1800cc water cooled	L			104-6004	104-6024		
Formula Vee, 9mm cap screw	E	104-6005	104-6025				

①*Replacement for 13/32" bolt* * *Not Wave-Loc* *Red part numbers indicate new items.*

NOTE: To help identify the proper replacement rod bolts we are showing photos of all available styles per head design. These are indicated as A-M on the previous page. Please verify style similarities when replacing rod bolts.

MATERIAL SPECIFICATIONS

Selecting the optimum material for use in a given application is of paramount importance. That's why ARP manufactures fasteners from a wide assortment of materials…ranging from popular stainless steel and 8740 chrome moly to exotic alloys that have been developed to handle space travel. You should also know that there are grades within specific alloys. For example, 8740 is available in four grades: 1. SDF (guaranteed seamless and defect free). 2 CHQ (cold head quality). 3. Aircraft. 4. Commercial. ARP uses only the first two (SDF and CHQ), even though they cost more than double "Aircraft" quality. These are the important features that set ARP squarely at the forefront of the industry. Each and every fastener that carries the ARP name is made from the best possible material for the application, carefully heat-treated in-house, and machined to perfection.

STAINLESS STEEL: Ideally suited for many automotive and marine applications because stainless is tolerant of heat and virtually impervious to rust and corrosion. ARP "Stainless 300" is specially alloyed for extra durability. It's polished using a proprietary process to produce a beautiful finish. Tensile strength is typically rated at **170,000 psi**.

8740 CHROME MOLY: Until the development of today's modern alloys chrome moly was popularly considered a high strength material. Now viewed as only moderate strength, 8740 chrome moly is seen as a good tough steel, with adequate fatigue properties for most racing applications, but only if the threads are rolled after heat treatment, as is the standard ARP production practice. Typically chrome moly is classified as a quench and temper steel, that can be heat treated to deliver tensile strengths between **180,000** and **210,000 psi**.

ARP2000: An exclusive, hybrid-alloy developed to deliver superior strength and better fatigue properties. While 8740 and ARP2000 share similar characteristics—ARP2000 is capable of achieving clamp loads in the **215,000-220,000 psi** range. ARP2000 is used widely in short track and drag racing as an up-grade from 8740 chrome moly in both steel and aluminum rods. Stress corrosion and hydrogen embrittlement are typically not a problem, providing care is taken during installation.

L19: This is a premium steel that is processed to deliver superior strength and fatigue properties. L19 is a very high strength material compared to 8740 and ARP2000 and is capable of delivering clamp loads in the **230,000-260,000 psi** range. It is primarily used in short track and drag racing applications where inertia loads exceed the clamping capability of ARP2000. Like most high strength, quench and temper steels—L19 requires special care during manufacturing to avoid hydrogen embrittlement. This material is easily contaminated and subject to stress corrosion. It must be kept well-oiled and not exposed to moisture.

AERMET 100: With a typical tensile strength of **280,000 psi**, Aermet 100 is a new martensitic super-alloy that is stronger and less expensive than the super-alloy austenitic materials that follow. Because it is capable of achieving incredibly high clamping loads, it is ideal for short but extreme environments like top fuel, funny car and some short track applications. Although Aermet 100 is a maraging steel that is far superior to other high strength steels in its resistance to stress corrosion, it must be kept well-oiled and not exposed to moisture.

INCONEL 718: A nickel based material that is in the high temperature, super-alloy class, it is found to be equally suitable in lower temperature applications. This material delivers tensile strengths into the **220,000 psi** range and exhibits improved fatigue properties. Best of all, Inconel 718 is completely immune to hydrogen embrittlement and corrosion.

ARP3.5 (AMS5844): While similar to Inconel 718, these super-alloys are found in many jet engine and aerospace applications where heat and stress attack the life of critical components. The high cobalt content of this alloy, while expensive, delivers a material with superior fatigue characteristics and typically tensile strength in the **270,000 psi** range. The immunity to hydrogen embrittlement and corrosion of these materials is a significant design consideration. These materials are primarily used in connecting rods where extremely high loads, high RPM and endurance are important factors—Formula 1, Winston Cup and CART applications.

CUSTOM AGE 625+: This newly formulated super-alloy demonstrates superior fatigue cycle life, tensile strength and toughness—with complete resistance to atmospheric corrosion and oxidation. ARP is the first to develop manufacturing and testing processes for fasteners with Custom Age 625+. Best of all it is less expensive and expected to soon replace MP-35 as the material of choice in the high strength, super-alloy field. Typical tensile strength is **260,000 psi**.

QUICK REFERENCE GUIDE TO MATERIALS USED IN FASTENERS

MATERIAL	USE?	YIELD STRENGTH	TENSILE STRENGTH	USED FOR
Grade 5	**No**	90,000 psi	120,000 psi	Accessory bolts and studs
Grade 8	**No**	120,000 psi	150,000 psi	Accessory bolts and studs
"Stainless 300"	Yes	140,000 psi	170,000 psi	Accessory bolts & studs, head studs
ARP Custom 450	Yes	150,000 psi	180,000 psi	Head bolts, accessory bolts
8740 chrome moly	Yes	160,000 psi	190,000 psi	Rod bolts, head & main studs & bolts
A286	Yes	170,000 psi	200,000 psi	Head bolts, connecting rod bolts
ARP2000	Yes	180,000 psi	215,000-220,000 psi	Connecting rod bolts
L19	Yes	200,000-230,000 psi	230,000-260,000 psi	Connecting rod bolts
Inconel 718	Yes	190-210,000 psi	220-240,000 psi	Connecting rod bolts
Custom Age 625+	Yes	235-255,000 psi	250-280,000 psi	Head studs, connecting rod bolts
ARP 3.5	Yes	220-250,000 psi	250-280,000 psi	Connecting rod bolts
Aermet 100	Yes	258,500 psi	300,000 psi	Connecting rod bolts

SPECIAL NOTE: The U.S. Government has recently implemented new guidelines relating to rating fastener strength. Unless a specific fastener has been tested in a government approved independent lab, manufacturers are enjoined from using a specific rating. Even though, in the case of ARP, the very same equipment and testing procedures are used in-house. Rather than have expensive duplicate tests run on literally hundreds of part numbers. Which would drive the cost of each fastener through the roof, ARP is following approved guidelines by using generalities to describe strength ratings. Please remember that ARP is one of the few firms in the world licensed by the U.S. Government to manufacture MS21250 fatigue rated fasteners and is QPL (Qualified Products Listed). There are few fastener manufacturers in the world with ARP's proven reputation for producing quality products.

PRO SERIES CONNECTING ROD BOLTS

- *Forged in-house at ARP using only the finest quality materials*
- *Heat treated using special racks to assure complete 360° penetration*
- *Threads rolled after heat treat to provide up to 10-times longer life*
- *Specially designed for optimum reliability in each application*

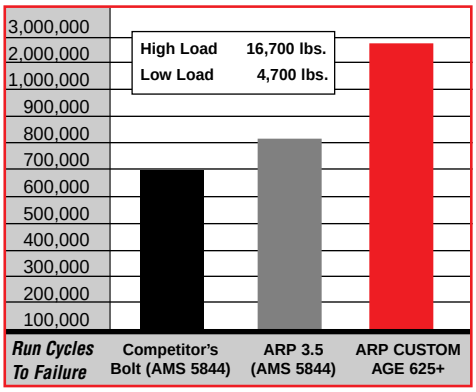
ARP rod bolts are used in everything from 18,000 rpm Formula 1 engines to 6,000 horsepower nitro-burning Top Fuel motors

A large number of connecting rod manufacturers have chosen ARP bolts as standard equipment. They're proud to advertise their products as being equipped with ARP rod bolts. And for good reason. The "weak link" in a connecting rod has always been the bolt, and racers know that nobody builds a better bolt than ARP. However, it is critically important to monitor the stretch of each bolt and replace it when it has permanently elongated by .001". Below you will find an extensive listing of aftermarket connecting rods and replacement bolt specifications.

In some instances you may want to go to an ARP rod bolt made from a better grade of material. This will provide you with improved reliability. However, please understand that when you want bolts made from exotic, super high strength materials, the cost will increase significantly. If you're on a budget, it's best to go with the most cost-effective solution. This is typically defined by the loads that are carried by the bolts in terms of piston/rod weight and the rotational speed of the engine. The most cost effective design is the one in which the bolt strength is just great enough to handle it's anticipated load—plus a safety margin for the occasional overloads. Using a material which has far more strength than required is not as cost effective…but will definitely give you an extra margin of safety and longer service life.

You should also know that ARP rod bolts are superior to those from other manufacturers. Especially in the area of fatigue strength. At the bottom of this page you'll find a chart that graphically shows the difference between ARP Pro Series rod bolts and the fastener made by a leading competitor. It's easy to see why ARP bolts are superior. As such, it makes sense to rely on ARP for optimum connecting rod service and reliability.

A detailed list of all connecting rod bolt materials used by ARP is on page 10.



Application	Material	Under Head Dimensions	Thread Dia.	Wrench Dia.	Complete Set	2-Piece Pack
Ford 427 and general replacement for aluminum rods, w/washer	8740	1.800"	7/16"	7/16"	200-6001	200-6021
Venolia, BRC, aluminum rod replacement, with washer	8740	1.800"	7/16"	7/16"	200-6002	200-6022
Manley Elgin replacement, alum. rod part no.14050 & 14054	8740	1.800"	7/16"	7/16"	200-6003	200-6023
General replacement, aluminum rods, with washers	8740	2.000"	7/16"	7/16"	200-6004	200-6024
Manley replacement rods	8740	1.600"	7/16"	7/16"	200-6006	200-6026
Manley replacement, rod part number 14051 and 14055	ARP2000	1.850"	7/16"	7/16"	200-6201	200-6221
Carrillo replacement for H-bolt, without washers	L19	1.700"	7/16"	1/2"	200-6203	200-6223
Venolia, Brooks, KB, Aluminum rod replacement with washer	ARP2000	2.000"	7/16"	1/2"	200-6206	200-6226
Venolia, Brooks, KB, Aluminum rod replacement with washer	L19	2.000"	7/16"	1/2"	200-6506	200-6526
Venolia, Brooks, KB, Aluminum rod replacement with washer	Inconel 718	2.000"	7/16"	1/2"	200-6806	200-6826
Venolia, Brooks, KB, Aluminum rod replacement with washer	Custom Age 625+	2.000"	7/16"	1/2"	300-6706	300-6726
Carrillo, Lentz, Ferrea replacement without washer	ARP3.5	1.750"	7/16"	1/2"	300-6601	300-6621
Carrillo, Lentz, Ferrea replacement without washer	Custom Age 625+	1.750"	7/16"	1/2"	300-6701	300-6721
Carrillo Replacement, 16 piece set	ARP3.5	1.600"	3/8"	7/16"	300-6602	300-6622
Carrillo Replacement, 16 piece set	Custom Age 625+	1.600"	3/8"	7/16"	300-6702	300-6722
Carrillo replacement, 8 piece set	ARP 3.5	1.600"	3/8"	7/16"	300-6603	300-6623
Carrillo replacement, 8 piece set	Custom Age 625+	1.600"	3/8"	7/16"	300-6703	300-6723
Carrillo replacement, 8 piece set	ARP 3.5	1.500"	5/16"	3/8"	300-6608	300-6628
Carrillo replacement, 8 piece set	Custom Age 625+	1.500"	5/16"	3/8"	300-6708	300-6728
General replacement, steel rods, 8 piece set	ARP2000	1.500"	3/8"	7/16"	200-6207	200-6227
General replacement, steel rods, 8 piece set	ARP2000	1.750"	3/8"	7/16"	200-6208	200-6228

Red part numbers indicate new items.