

# **BARROW**

**P R E C I S I O N**

*Hints and tips for the care of your rods*



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Certificate No. 91356

# Introduction

## Arrow & ARP Care

Here at Arrow great care has been taken to manufacture and deliver the ultimate connecting rod for each and every one of our clients. All our rods are dispatched in first class condition, carefully sleeved and double boxed.

All areas of the rod have been rumbled and peened to create a compressed hardened layer. removal of this layer will cause a stress concentration, possibly leading to a failure. We therefore recommend that you don't attempt to modify or polish rods. Arrow offer an overhaul service which includes peening, if necessary, to re-establish a compressed layer.

During an engine strip, carefully check the rods for any signs of fatigue, in particular chips, cracks and discoloration. You may have purchased a previously used engine fitted with our rods. We can offer a reconditioning service which includes a full inspection, crack detection, peen and re-bushing. All at no great cost, and far preferable to engine failure.

Please carefully read the instructions in this booklet to ensure a long and reliable partnership between your Arrow Rods & ARP fasteners.

## Proper Fastener Retention

There are three methods which can be employed to determine how much tension should be exerted on a fastener, using a torque wrench, measuring the amount of stretch and turning the fastener a predetermined amount (torque angle). Of these methods, the use of a stretch gauge is the most accurate.

It is important to note that in order for a fastener to function properly it must be "stretched" a specific amount. The material's ability to "rebound" like a spring is what provides the clamping force. You should know that different materials react differently to these conditions, and ARP engineers have designed bolts to operate within specific ranges.

If a fastener is over torqued and becomes stretched too much - you have exceeded the yield strength and it is ruined. If the fastener is longer than manufactured, even if it is only .001", it is in a partially failed condition. Therefore, ARP has engineered it's fasteners with the ductility to stretch a given amount and rebound for proper clamping.

We highly recommend the use of a stretch gauge when installing rod bolts. If it is not possible to measure stretch, Arrow has developed a torque angle method. The use of the torque wrench data is for guide purposes only.

## Specification

### **CUSTOM AGE 625 PLUS**

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 soon to replace MP-35 as the material of choice in the high strength, super-alloy field. Typical tensile strength is 260,000 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 upgrade to 8740 chrome moly in both steel and aluminium rods. Stress corrosion and hydrogen embrittlement are typically not a problem, providing care is taken in installation.

## Steel Connecting Rod Stretch Method

To achieve correct bolt pre-load and to ensure big end bore roundness after re-assembly.

- Ensure mating faces are wiped clean, Remove any old grease from threads of bolts and rod.
- Apply ARP moly assembly lubricant to seating face of bolt and threads of bolt and rod.
- Assemble cap to rod
- Torque to 10 Nm.
- Tighten each bolt to recommended stretch value i.e. Loosen first bolt, zero stretch gauge, tighten until correct stretch is achieved.  
Loosen second bolt, zero stretch gauge, tighten until correct stretch is achieved.

See note.

NOTE: To optimise accuracy of the big end bore size and roundness, and to achieve correct bolt pre-load, each bolt should be stretch gauged. A torque wrench setting is given as a guide ONLY.

## Titanium Connecting Rod Stretch Method

To achieve correct bolt pre-load and to ensure big end bore roundness after re-assembly.

- Ensure mating faces are wiped clean, remove all old grease from threads.
- Assemble cap to rod and apply ARP moly to threads of stud and seating faces of nut and washer.
- Torque to 10 Nm
- Tighten each stud to recommended stretch value
- i.e. Loosen first nut, zero stretch gauge, tighten until correct stretch is achieved.

Loosen second nut, zero stretch gauge, tighten until correct stretch is achieved.

## Torque/Angle Assembly Method

Arrow engineers have developed this method. We found it to be repeatable and far more accurate than relying on torque alone. It can also be used in a situation where access prevents the use of a stretch gauge.

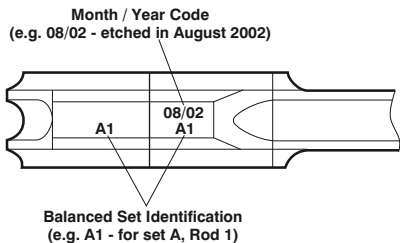
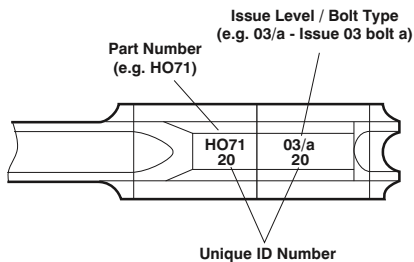
- Use moly grease as recommended for either steel or titanium rods
- Apply to threads and seating faces of bolts / nuts.
- Torque each bolt to 10 Nm
- Rotate each bolt to the recommended angle.
- Repeat cycle 5 times to achieve accuracy.

Note:- Ensure torque wrench is calibrated.

Torque angle Gauge “Snap-on TA360” Available now from [www.arrowprecision.com](http://www.arrowprecision.com)

# Rod Markings

**Understanding the laser etched markings on your rods can save a whole lot of time & trouble in the long run.**



# Bolt Identification

- a** 5/16 UNF Custom Age 3AG1.500-10U  
Torque 30ft/lbs , Stretch .0058"/.0062"  
(41 Nm , Stretch 0.147 – 0.157 mm)  
10 Nm + 60°
- b** 3/8 UNF Custom Age 4AJ1.600-10SLU  
Torque 50ft/lbs , Stretch .0068"/.0072"  
(68 Nm , Stretch 0.173 – 0.183 mm)  
10 Nm + 85°
- c** 7/16 UNF Custom Age 300-6701  
Torque 85ft/lbs , Stretch .0068"/.0072"  
(115 Nm , Stretch 0.173 – 0.183 mm)  
No torque / angle data available
- d** 5/16 UNF ARP2000 3AG1.505-2U  
Torque 24ft/lbs , Stretch .005"/.0055"  
(33 Nm , Stretch 0.127 – 0.140 mm)  
10 Nm + 50°
- e** 3/8 UNF ARP2000 4AJ1.500-2SU  
Torque 43ft/lbs , Stretch .0055"/.0059"  
(58 Nm , Stretch 0.140 – 0.150 mm)  
10 Nm + 72°
- f** 3/8 UNF ARP2000 4AJ1.750-2SU  
Torque 45ft/lbs , Stretch .0068"/.0072"  
(61 Nm , Stretch 0.173 – 0.183 mm)  
10 Nm + 82°
- g** 7/16 UNF ARP2000 4AP1.550-2CL  
Torque 65ft/lbs , Stretch .0056"/.0060"  
(88 Nm , Stretch 0.142 – 0.152 mm)  
10 Nm + 70°
- h** 7/16 UNF ARP2000 4AP1.725-2CL  
Torque 75ft/lbs , Stretch .0064"/.0068"  
(102 Nm , Stretch 0.163 – 0.173 mm)  
10 Nm + 77°

- i** 5/16 UNF Wave-loc (44M UHL) AR301-2W  
Torque 32ft/lbs , Stretch .0058"/.0062"  
(43 Nm , Stretch 0.147 – 0.157 mm)  
No torque / angle data available
- j** 5/16 UNF Wave-loc 254-6402  
Torque 30ft/lbs , Stretch .0067"/.0071"  
(41 Nm , Stretch 0.170 – 0.180 mm)  
10 Nm + 82°
- k** 5/16 UNF ARP3.5 3AG1.500-7U  
Torque 30 ft/lbs , Stretch .0058"/.0062"  
(41 Nm , Stretch 0.147 – 0.157 mm)  
No torque / angle data available
- m** 5/16 UNF Custom Age 3AG1.260-10U  
Torque 35 ft/lbs , Stretch .0055"/.006"  
(47 Nm , Stretch 0.140 – 0.152 mm)  
10 Nm + 56°
- n** 3/8 UNF ARP2000 4AJ1.600-2SU  
Torque 45 ft/lbs , Stretch .0053"/.0058"  
(61 Nm , Stretch 0.135 – 0.147 mm)  
10 Nm + 64°
- p** 3/8 UNF Stud EP028  
Torque 62 ft/lbs , Stretch .007"/.0075"  
(84 Nm , Stretch 0.178 – 0.191 mm)  
10Nm + 102°
- s** 5/16 UNF Stud EP024  
Torque 35 ft/lbs , Stretch .006"/.0065"  
(47 Nm , Stretch 0.152 – 0.165 mm)  
10 Nm + 78°
- t** 3/8 UNF Custom Age 4AJ1.500-10SLU  
Torque 45ft/lbs , Stretch .0062"/.0066"  
(61 Nm , Stretch 0.157 – 0.168 mm)  
10 Nm + 80°

**Note the free length of each bolt  
before and after fitting for a  
permanent record.**

**ROD #1**

LEFT: BEFORE \_\_\_\_\_ AFTER \_\_\_\_\_

RIGHT: BEFORE \_\_\_\_\_ AFTER \_\_\_\_\_

**ROD #2**

LEFT: BEFORE \_\_\_\_\_ AFTER \_\_\_\_\_

RIGHT: BEFORE \_\_\_\_\_ AFTER \_\_\_\_\_

**ROD #3**

LEFT: BEFORE \_\_\_\_\_ AFTER \_\_\_\_\_

RIGHT: BEFORE \_\_\_\_\_ AFTER \_\_\_\_\_

**ROD #4**

LEFT: BEFORE \_\_\_\_\_ AFTER \_\_\_\_\_

RIGHT: BEFORE \_\_\_\_\_ AFTER \_\_\_\_\_

**ROD #5**

LEFT: BEFORE \_\_\_\_\_ AFTER \_\_\_\_\_

RIGHT: BEFORE \_\_\_\_\_ AFTER \_\_\_\_\_

**ROD #6**

LEFT: BEFORE \_\_\_\_\_ AFTER \_\_\_\_\_

RIGHT: BEFORE \_\_\_\_\_ AFTER \_\_\_\_\_

**ROD #7**

LEFT: BEFORE \_\_\_\_\_ AFTER \_\_\_\_\_

RIGHT: BEFORE \_\_\_\_\_ AFTER \_\_\_\_\_

**ROD #8**

LEFT: BEFORE \_\_\_\_\_ AFTER \_\_\_\_\_

RIGHT: BEFORE \_\_\_\_\_ AFTER \_\_\_\_\_