



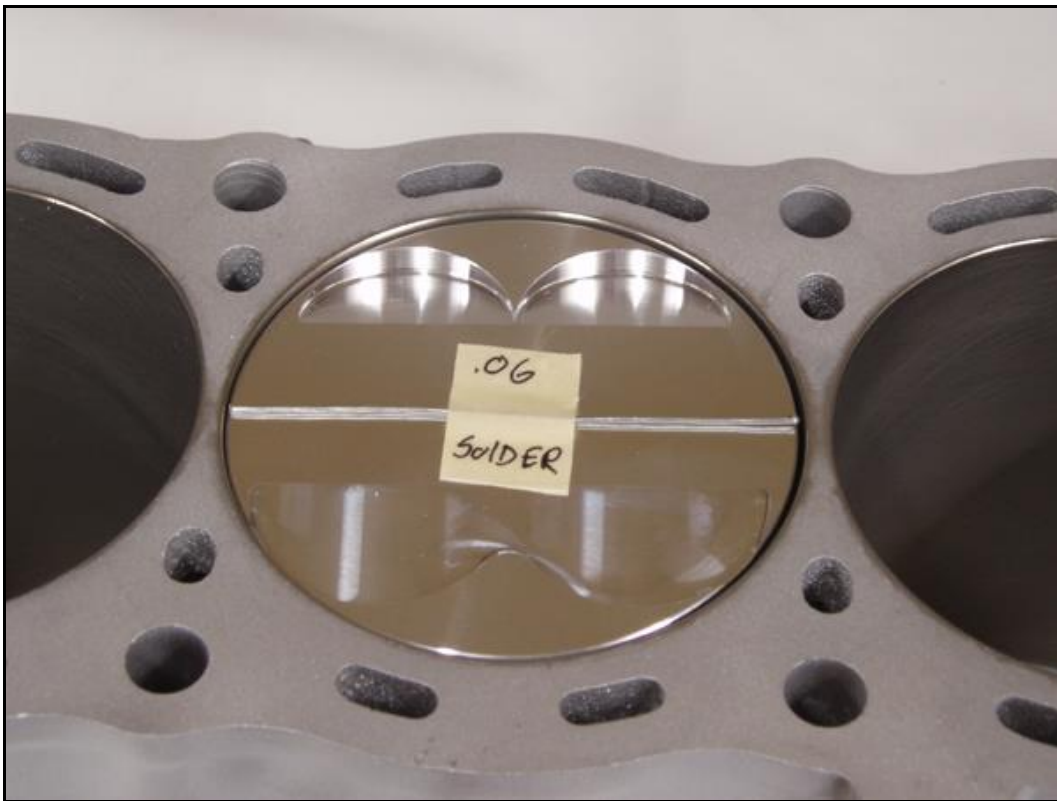
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### **Measured Assembled Clearance or M.A.C.**

M.A.C. is the distance between the top of the piston and the flat surface of the cylinder head with the engine completely assembled as it is going to be operated. M.A.C. measurements are critical to engine longevity and performance. Production tolerances between components can add or reduce the clearance. This is normal. A properly built engine will have a precision measured/adjusted M.A.C. If the MAC is too tight, the pistons can collide with the head resulting in catastrophic engine failure. If the M.A.C. is too loose, a serious loss in compression and horsepower can result. The "trick" is to find the perfect match. The only true way to do this is with experience. The following is a culmination of our experience for Hayabusa's using our Brock's Performance Products Top End Kit components.

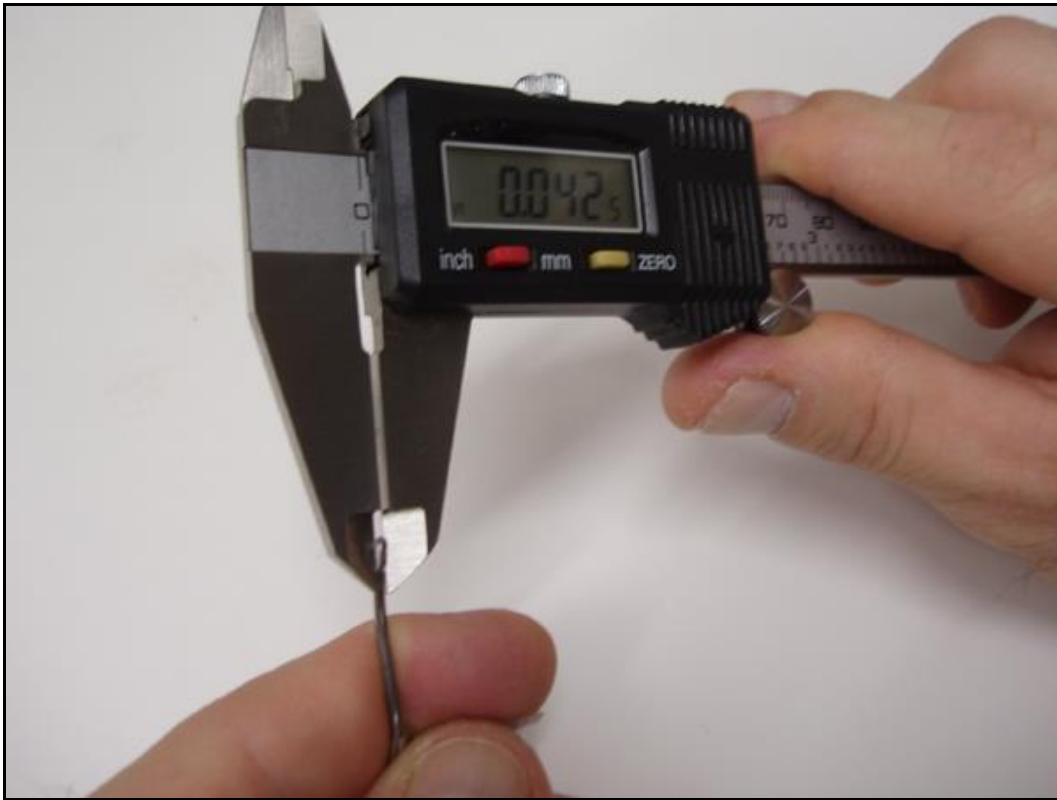
Attached is a photo of how we measure piston to head clearance with a piece of electrical solder.



We try to find 1/16 inch (.062) thick solder. Any solder larger than .050 and smaller than .070 will be fine. Solder over .070 is VERY hard to compress.

Note: The chemical make up (example: 50/50 or rosin core etc.) DOES NOT make any difference. We are simply compressing a soft material which will hold its form for measurement afterwards.

The idea is to "squish" the solder between the piston and head with the engine assembled...then measure the newly flattened sides with dial calipers.



**Step by step:**

1. Install the base gasket and dowel pins.
2. Temporarily install the pistons on the rods. Rings are not required.
3. Note: add a small amount of WD-40 to the piston skirts and cylinders to prevent scuffing. Slide the cylinders down over the pistons.
4. Install the solder as shown (parallel to the wrist pin bores) in the photo and secure with tape.  
FYI: Most good builders install the solder on all four cylinders. (Some alter parallel/perpendicular and average the perpendicular readings as piston rock usually creates an inconsistency between sides.)
5. Install the head gasket and dowel pins.
6. Install the cylinder head, torque to 25 ft-lbs. (We have tested at 40 ft-lbs with no difference in results.)
7. Rotate the engine 360 degrees (in normal operating direction) at the crank shaft until you feel the solder compress on both upward strokes. DO NOT allow the cam chain to bind during rotation!
8. Remove the cylinder, label solder pieces 1-4 to match the bore locations.
9. Measure the compressed ends of the solder with dial calipers.

Brock's Performance Products recommends a MINIMUM measured assembled clearance of at least .037 inch. This is considered TIGHT by most Hayabusa engine builders when using our Top End Components and a Stock Rev limiter. Clearance in this area should not be attempted unless Carrillo H-Beam rods are used and crank/rod bearing tolerances have been optimized. A safer number is around .042 for use in Street/race applications especially with an extended rev limiter and Dry Nitrous. .050 is the Maximum M.A.C. we recommend for good power and reliability. This is especially the case with larger shots of wet Nitrous and/or sustained High RPM use (Maxton). Any M.A.C. over .050 in normally aspirated applications will result in lower power output.

**FYI:** Brock's Performance Products stocks copper shim gaskets for precise adjustments of M.A.C.