

4. QUALITY CONTROL

a. Tolerances and specifications

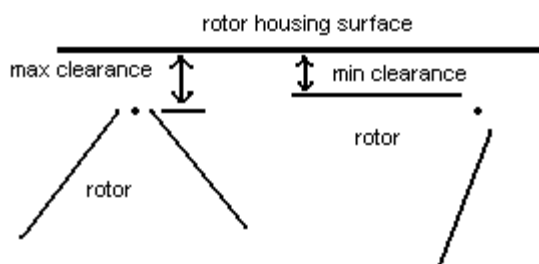
I would be quite easy to just list out all of the theoretical tolerances and specifications for a rotor housing, yet this would be of no practical use unless you first understand what is currently being manufactured.

Contrary to popular belief, the inner surface of a Mazda rotor housings is NOT a perfect trochoid as described by the following set of parametric equations;

$$\left. \begin{aligned} x &= e \cos \alpha + R \cos \alpha/3 \\ y &= e \sin \alpha + R \sin \alpha/3 \end{aligned} \right\}$$

It is rather a parallel trochoid curve offset by a constant amount α , this value of α is added to the generating radius R and this provides clearance for the apex seal, in the case of the Mazda engines, the value of α is 3mm. We will get to the tolerances and variations in these values shortly.

Another common misconception is that the clearance between the tip of the rotor and the rotor housings should remain constant along the entire trochoid surface. This is absolutely not true nor is it possible. This would be true only if the maximum angle of oscillation was to be 0° and this is not possible. The actual max angle of oscillation of the Mazda engines is in fact 26.2° and varies as the rotor spins. As the angle of oscillation varies between the max and min values the clearance between the rotor and the rotor housing also varies between the set max and min clearances. The following diagram illustrates the basic mechanism of “how” this happens:



Although this sketch is not technically correct it helps to illustrate how the clearance changes as the angle of oscillation changes.

The general Mazda guidelines for clearance are 0.017" to 0.030". The minimum practical clearance at TBC at the minor axis for a performance naturally aspirated engine (up to 300 hp) is about 0.010" to avoid rotor to housing contact, for forced induction motors this value is slightly higher; 0.014".

A good new Mazda Renesis rotor housing will generally have a min clearance of 0.015" – 0.026".

There are several ways to measure these clearance values and each method may yield slightly different results. We have constructed a fixture that permits consistent and repeatable clearance measurements for every housing that we measure. To do this we have a half engine on our test rig using zero tolerance bearings and an optical clearance sensor for dynamic clearance measurement while the engine operates at 800RPM, we also perform a static clearance measurement of each housing using traditional calibrated feeler gauges. The rotor that we use in our test fixture has also been measured on a CMM (digital coordinate measuring machine) to assure that the rotor dimensions are exact as variances in rotor shape and size will consequently affect clearance measurements.

JHB cermet housings are manufactured with the following clearances unless otherwise requested by the customer:

Minimum clearance of 0.015" to 0.032". For race engines we can modify the clearances to accommodate high RPM operation (see Racing Modifications section).

Rotor housing width is also measured in accordance with Mazda specifications. Our standard process can occasionally restore slightly warped or shrunk housings up to about 0.002". If so desired, we can also fix housings that are warped or shrunk beyond this amount for an extra charge.

Here are some other parameters that we measure:

Trochoid profile:

e = 15mm +/- 0.05mm

R = 102mm +/- 0.05mm

alpha = 3mm +/- 0.25mm

Waviness = +/- 0.01mm

Coating thickness = 0.152mm +/- 0.038mm

Bond strength: 11500 psi+

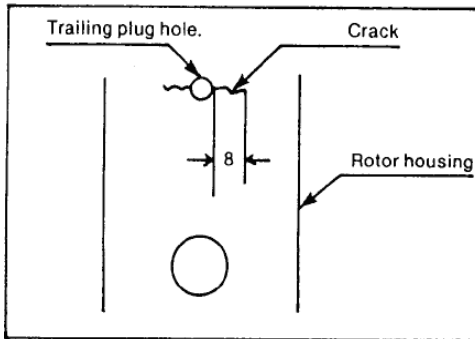
b. Core guidelines

All cores being sent to JHB Performance must be clean and free from oil and debris. Parts that are excessively dirty will result in a cleaning surcharge. If you do not have access to a parts washer or do not own a pressure washer we recommend you take your parts to the car wash and spray them down.

You should also be very aware of the state of your parts before you send them to JHB Performance. If we receive parts that are out of specification we will not be able to remanufacture or alter these parts and you will be wasting your money on shipping these to us. In accordance with Mazda specifications, the parts should meet all of the following criteria in order to be considered cores;

i) Rotor Housing Inspection

Cracking by trailing plug hole: The maximum allowable projection of these cracks by Mazda is 8mm as indicated in the diagram below. We can repair housing that do not meet these inspection criteria at an additional charge and recommend that this repair be done only to "special" housings that have been extensively modified and have a higher replacement value.

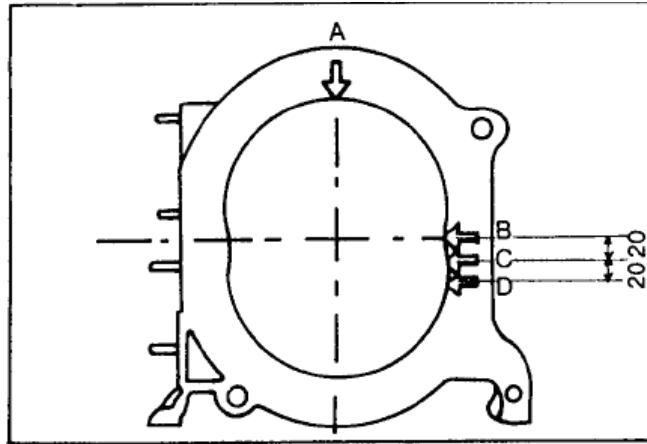


Rotor housings width: The rotor housing must be inspected to ensure the width is within the allowable limits. Measure the width or thickness of the rotor housing at points A, B, C and D as shown in the figure below. Points C and D are each 20mm steps, individually beginning at point B. Compare the dimension at point A with the smallest of the other three, whichever it is. If the difference is more than 0.06 mm the housing will not qualify as an acceptable core. We can repair housing that do not meet these inspection criteria at an additional charge and recommend that this repair be done only to "special" housings that have been extensively modified and have a higher replacement value.

Rotor housing width should be:

13B Engine 80mm (3.149")

12A Engine 70mm (2.756")



Visual inspection after cleaning: Once the part is clean, carefully inspect the rotor housing o-ring grooves to ensure that no grooves have been compromised due to excessive corrosion. Also inspect the water passages for corrosion.

ii) Trochoid Surface Inspection

Chrome housing honing service: For this service, we remove a maximum of 0.003" of chrome. This removal amount will take out imperfections such as chatter marks, tapers, wear and slight grooves that are often found by the trailing plug. Grooves or imperfections that are deeper than 0.003" will not be 100% remedied by this service. The customer should inspect the housings to ensure that they are aware of which imperfections exceed the 0.003" limit.

Cermet B coating service: For this service, we can repair trochoid surface damage such as chrome flaking, chatter, tapers, wear and all such imperfections that do not penetrate into the steel liner more than 0.015". Damage and imperfections that penetrate into the steel liner more than this amount are at risk of showing up in the final ground surface.

Cermet A & X coating service: For this coating service we can repair all of the same trochoid surface damages as in cermet B coating as well as deeper grooves and damage that can be caused by apex seal failure to a maximum depth of 0.030" into the steel liner. These damaged areas should be photographed and e-mailed to us for inspection before sending us your housings and we only recommend fixing this sort of damage on "special" housings that have been extensively modified and have a higher replacement value.

iii) End Housing Inspection

The customer should inspect the end housings for any damage to the o-ring grooves or any cracks in the cast iron material prior to sending these parts for cermet coating.

c. Warranty

JHB Performance cermet coatings are harder, more wear resistant and longer lasting than any other coating available. We are very proud to stand behind our cutting edge cermet coatings and back them with a limited 1-year warranty, the same as a brand new Mazda rotor housing.

JHB Performance shall not, under any circumstances, be liable for any special, incidental or consequential damages, including, but not limited to, damage, or loss of equipment, loss of profits or revenue, cost of purchased or replacement goods, or claims of customers of the purchase, which may arise and/or result from sale, installation or use of our product. In the unlikely event of any warranty concerns, you must contact us to obtain a Returned Goods Authorization (RGA) number. Please be sure to call us BEFORE returning any items, as we will not give any warranties without the proper RGA number.