



# ENGINEERING REPORT

2015+ Volkswagen MK7 Golf TSI/GTI/R Performance Radiator | SKU: MMRAD-MK7-15

By Jason Wettig, *Mishimoto Engineer*

## REPORT AT A GLANCE

- **Goal:** Create a Radiator that outperforms the stock units. The Mishimoto parts should install directly into the MK7 with minimal cutting and modification required.
- **Results:** The Mishimoto Radiator dropped global coolant temperatures by 5 degrees F. Increased Core Volume by 56% and external fin area by 76% over the stock unit.
- **Conclusion:** The Mishimoto radiator performed better than the stock unit and provided better cooling. It is a valuable upgrade for MK7 owners who drive their vehicles on tracks or in hot climates.

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## DESIGN OBJECTIVES

The design requirements assigned to this project are as follows:

- Create a radiator that outperforms the stock unit
- Must be direct fit

## DESIGN AND FITMENT

The R&D process began by evaluating the stock system and understanding how the team who developed the MK7 chose to package the cooling stack. We needed to understand the layout and available space before the core could be increased in size. A good understanding of how the stock system works was also required.

The radiator was designed to maximize size and require no modification to stock components. Like all our products, we

tested multiple cores. In this case, we tested a triple pass core vs. a single pass core. Sometimes a triple pass can help increase cooling in certain applications. Various factors like pump speed, air speed, and pressure drop across the core will affect cooling efficiency. Both triple pass and single pass were 42mm thick cores with fully strutted tubes for increased strength.

The Mishimoto Radiator also saw a core volume increase of 56% when compared to stock. Figure 2 shows this comparison.

The Mishimoto Radiator increases the fin surface area by 76% when compared to stock. With the thicker core and more rows, a larger amount of fin surface area can be created. Figure 3 displays this difference between the stock and Mishimoto heat exchanger.



FIGURE 1: Mishimoto production sample radiator.

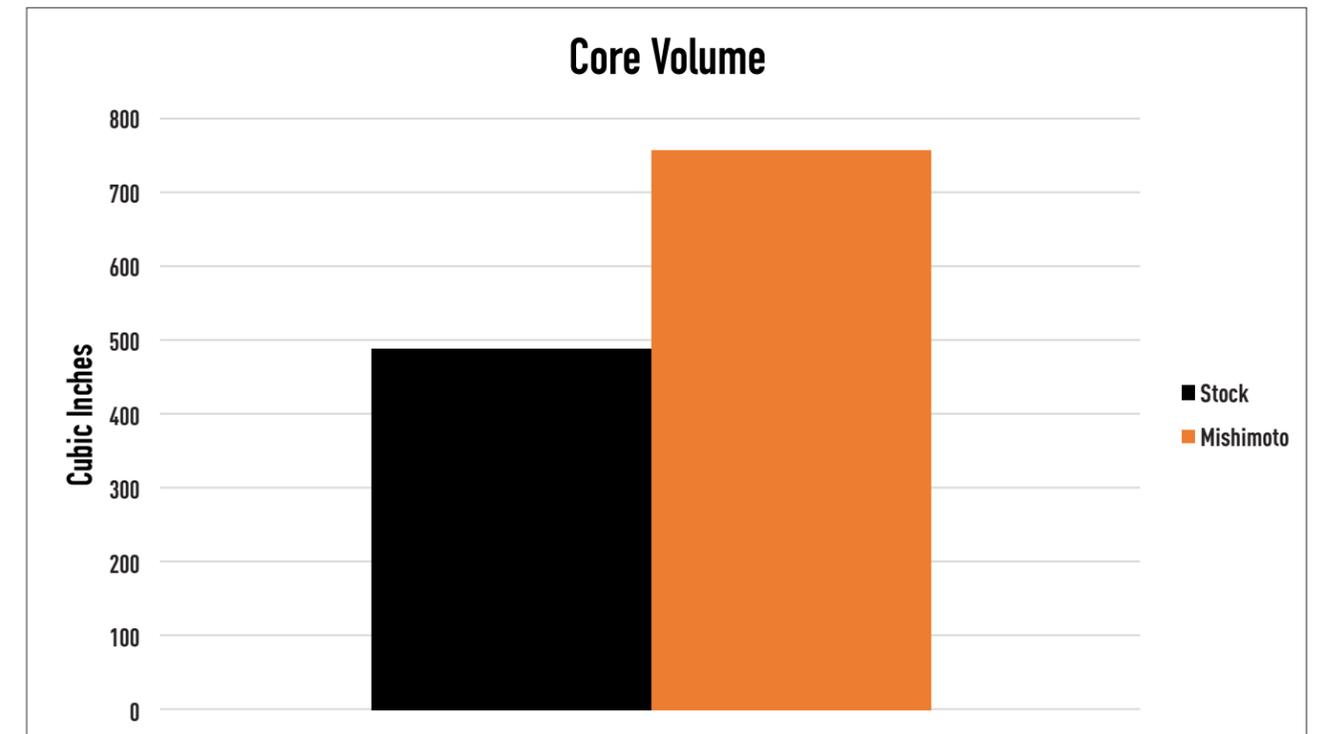


FIGURE 2: The Mishimoto Heat Exchanger has a larger core volume; this promotes better heat transfer.

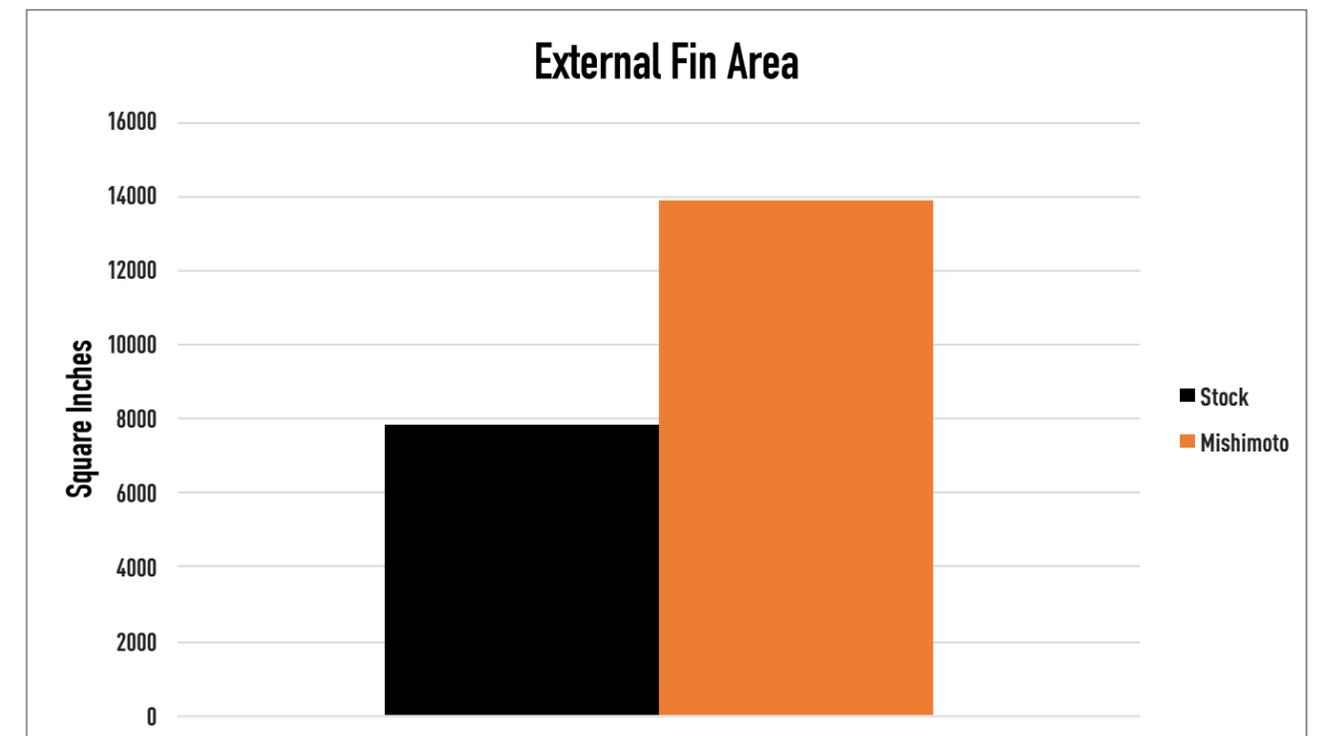


FIGURE 3: The Mishimoto Heat Exchanger features an increase in fin surface area, which promotes greater heat transfer.

## PERFORMANCE TESTING

The testing was performed in our climate-controlled dyno area. All radiators were tested under the same conditions. In order to generate plenty of heat inside the cooling system, the dyno paks were used and placed at high load. A continuous load test was performed where the vehicle was running at WOT and the dyno paks provided enough load to hold the vehicle's RPMs at 3200 for 1 minute of testing. A large fan was used to generate 60MPH wind speeds to the front of the vehicle. Temperature and pressure sensors were placed in the inlet and outlet radiator hoses to monitor the coolant temperature and pressure. To ensure repeatable data was captured, the tests were performed four times on each of the cores; stock, Mishimoto single pass, Mishimoto triple pass.

The results concluded that the Mishimoto single pass radiator outperformed both stock and the triple pass radiator. The global coolant temperatures were decreased by 5 degrees F with the Mishimoto single pass unit. This is due to the increased core thickness and improved fins over the stock system. From our testing, it has been concluded that a triple pass radiator is not a good fit for this application. The pressure drop across the core was much higher than the stock and Mishimoto single pass unit.

## CONCLUSION

The Mishimoto single pass radiator helped keep the MK7 cooler while running through the tough conditions on our dyno. This was achieved by having better fins, more fin surface area, and greater core volume. This replacement will help keep engine temperatures cooler while running on the track or under spirited driving.

Jason Wettig

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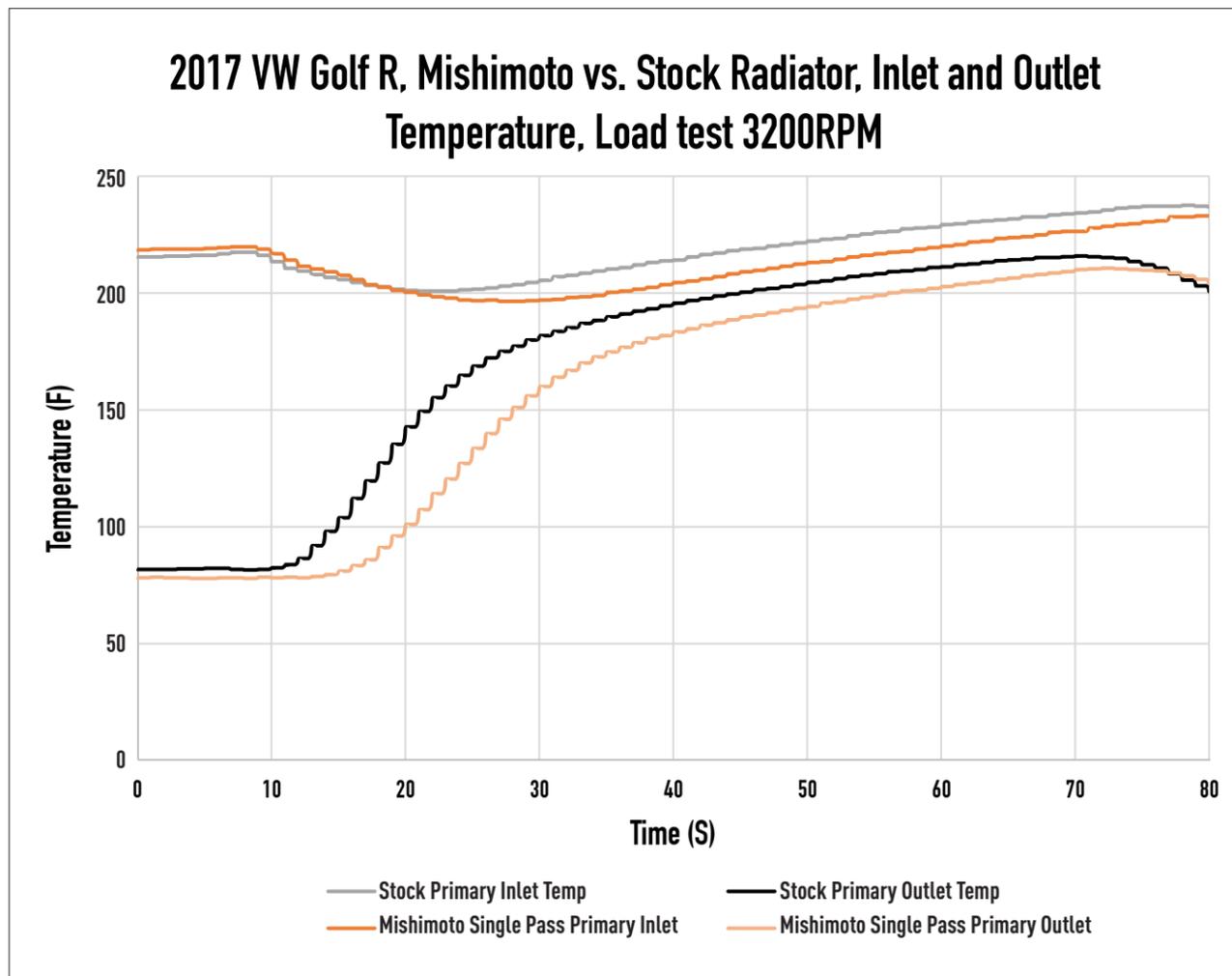


FIGURE 4: The Mishimoto vs. the stock Radiator. This shows how the Mishimoto unit kept the outlet and global coolant temperatures lower.

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