

VW 1.4L TSI Twincharger CAV / CTH Engines: No Compression & Cracked Pistons

All Head Services recently had a VW Tiguan 1.4L TSI "Twincharger" CAVD engine sent in for a rebuild due to low compression on number two cylinder. The engine was dismantled for inspection, and number two cylinder's piston rings had worn through the ring land of the piston, and the other three pistons had cracks in the ring lands.

These 1.4L TSI Twincharger engines are based on the EA111 engine family. They were designed on the idea of "downsizing" in which a powerful and very efficient smaller capacity engine can do the same jobs as a larger less efficient engine while consuming less fuel. In this case with a combination of supercharging, turbocharging and direct fuel injection. These engines have won the award for best engine in the 1.0L to 1.4L class from 2006 to 2014 and was awarded the best overall International Engine of the Year for 2009. (See Tech Talk July 2007 page 2597 for system overview)

They are used in Volkswagen Golf, Jetta, Scirocco, Tiguan, EOS, Polo and Passat. Also the Audi A3, Seat Leon and the Skoda Octavia from 2005 to 2013. They have engine I.D. codes starting with CAV or CTH. However, trouble was coming.

The piston issue surfaced early, and Volkswagen started a service campaign (24S4) in 2010 to reduce its occurrence. It involved reprogramming the ECU with recalibrated settings for the knock sensor. This may have been helpful; however, there was another problem that Volkswagen could not control.

These engines are designed to run on **95 RON** unleaded petrol. RON stands for Research Octane Number and the higher octane fuel allows the engine to compress the air/fuel mix to a higher compression ratio before detonation occurs. This makes the engine more efficient. However, as you have noticed at the service station, the higher the octane rating, the more expensive the fuel gets.

If the owners of these vehicles run the engine on 91 RON fuel because it is cheaper at the pump, it will cause preignition, detonation or pinging, which are all different names for uncontrolled combustion in the combustion chamber. This is combustion which occurs too early which then tries to force the piston back down the cylinder while it is still on the way up on the compression stroke.

Uncontrolled combustion can occur without any audible noise or knocking

There is your problem... This cylinder was missing from low compression caused by detonation.



from the engine. If it occurs for a prolonged period, it will cause the ring lands to crack, the rings will break, which then start to wear their way through the ring lands (as shown in the pictures). The first signs of this problem will be some rough running, then misfire related codes, but by this time, the damage has been done. A compression test should be conducted to confirm the issue.

These small, high output engines have been designed to perform very well when all of their requirements are met. You should have a chat with your customers with these engines and encourage them to use **95 RON** fuel, as recommended in their owner's handbook. Otherwise, the money they think they have saved by buying cheaper fuel, probably will not cover the cost of a rebuilt engine. ☐

All of the pistons had a crack in the ring lands.



We would like to thank Geoff, from All Head Services, for his technical knowledge & photos.
www.allhead.com.au

