

# ShopTalk

Tech Tips from a lifetime under the hood.....

## DIESEL

### Duramax- The Importance of IQA Numbers

A customer decided to install a complete set of M&D Injectors in a 2008 Chevy 6.6L Duramax. After installing the M&D Injectors the engine developed a fuel knock. I explained to the customer that he could use a scan tool to turn off each injector one at a time and locate the knocking cylinder. He stated that he tried that and had no success. All he wanted to do was bring the truck in for diagnostics. I informed the customer that we were able to help and just bring the truck in. When the truck arrived there was no question the engine had a fuel knock, in fact everyone in the shop could hear it. The customer met me half way into the parking lot with his truck. First thing I did was explain to the customer that driving the truck in this condition could cause a catastrophic engine failure to this expensive diesel engine. He informed me that the truck ran fine, had great power and no smoke. His only complaint was the loud fuel knock at idle. The customer was correct we could not locate the knocking cylinder with the Cylinder Balance Test or Cylinder Kill test. Oddly, at any engine speed above idle the knocking stopped. I found this puzzling. Here is a list of the engine data that we used for diagnostics.

Fuel Knock started at 100 degrees fuel temperature

Turning off the injectors one at a time using the Tech 2 scan tool made no difference in the fuel knock

Every time the #5 injector was turned back on during the cylinder balance test it produced 2 small extra fuel knocks

Turning off the pilot injection on cylinder #5 made no difference in the engine sound

Cylinders 5 and 7 balancing rates were higher than the rest of the cylinders. (#5 averaged -3.2) (#7 averaged +3.1)

We then gave the injector serial numbers (which are printed in the injector boxes) and the original M&D invoice to Andy Niblack. Andy is the manager of the Common Rail Rebuild Center at our M&D N. Shepherd location. He provided us with a list of the injector quantity adjustment numbers (IQA) and the injector flow rate numbers from the injector serial numbers. Using the Tech 2 with the injector quantity adjustment numbers (IQA) and injector flow rate numbers list we could now cross reference the IQA numbers in the ECM (engine control module) and the GPCM (glow plug control module). At this point of the diagnostics, we decided that the most important thing to do was to confirm that the IQA numbers in the ECM and GPCM were in the correct sequence for the correct cylinders. If correct, this would give us confidence that the customer had installed the IQA numbers in the correct cylinder sequence. So with the engine data available we decided to concentrate on injectors #5 and #7. Also by removing the #5 and #7 injectors we would be able to confirm the IQA numbers for each cylinder. With the injectors out we looked at the serial numbers from the list. This is when we found the cause of the loud fuel knock. It turned out to be just a simple mistake.

Here is the #5 IQA numbers and injector flow rate numbers from the M&D list and from the trucks ECM and GPCM.

M&D LIST (#5) C3E0BB00C6AE7-CORRECT

ECM & GPCM (#5) C30EBB00C6AE7-INCORRECT

We decided to give the two injectors to Andy for testing. This way we could confirm that we were not overlooking anything else. After testing, Andy found no fault with the injectors. With the two injectors reinstalled and with the correct IQA numbers the engine stopped knocking and the injector balance rates returned to normal.

Cylinder #5 balance rate (+0.1) -Cylinder #7 balance rate (+0.9)

#### Notes

Caution should be used when entering the Injector Quantity adjustment numbers (IQA)/ Injector Flow Rate numbers

GM stores the IQA numbers in the ECM and the GPCM. After entering the IQA numbers in the ECM make sure you transfer them into the GPCM

Injector balance rates can be effected by many things, such as Powertrain Mechanical Problems, Fuel Quality Issues, Performance After-Market Devices, Air in Fuel Problems and even Injector IQA numbers.

Thank You,  
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## Tech Tips.....