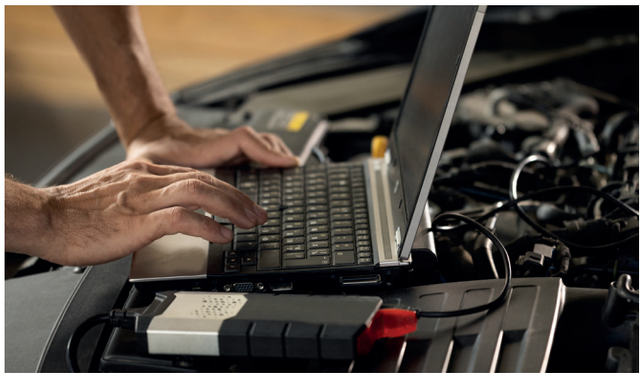
CARWOOD®

Technical bulletin

PRODUCT:	Common rail injector and pump
OEM:	Schaeffler (Continental, Siemens, VDO)
FITS:	VW Caddy with CAYD engine
JOB:	How to troubleshoot an engine misfire

The vehicle, a 2014 plate, presented with the engine warning light illuminated and the owner reporting long engine cranking, rough idling and exhaust smoke. Whilst these issues are typical of engine misfire, determining why is not always straightforward. Possible causes include a faulty high-pressure fuel pump or injector, problems in the fuel system, vacuum leaks and on rare occasions a compression drop in one or more cylinders, so it's important to follow a methodical approach when diagnosing one.

» **Interrogate the vehicle's fault code history** with an EOBD diagnostic tool to get a clearer picture of what is happening. In this instance the scan tool returned a P019100 fault code - fuel high pressure sensor.



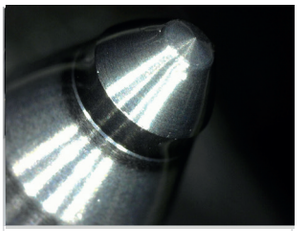
» **Test the injector's back leak** on vehicle to pinpoint possible faults. With the test kit connected, start the engine, let it run at idle speed for a while, then stop the engine and measure the diesel fuel in the containers. Unfortunately, there's no simple pass/fail criteria, and this method relies on experience. However, as a rule of thumb, look for an imbalance between the injectors; a high backleak flow on one injector doesn't necessarily mean this is at fault, and it's possible that the three others with a much lower backleak, are to blame.

» **Check the high-pressure pump:** if this test shows no rail pressure feedback during engine cranking, then a sealed rail kit must be used to isolate the high-pressure hydraulic system, as a faulty rail pressure sensor could misdiagnose a faulty high-pressure pump, wasting valuable time and money.

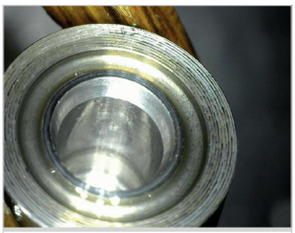
In this case, the high-pressure pump generated the correct rail pressure during engine cranking and engine idling, but was slow to do so. Based on the ECU fault codes and the injector backleak check, two of the injectors were thought to be faulty.

» **Have a specialist test the injectors:** although the simplest option would be to replace the pump and injectors, it's important to determine why they failed, and address this, before doing so. If not, the replacement units could fail. So have a specialist like Carwood test them.

Two of the injectors failed the basic hydraulic test with no injection, and the other two failed the bench test due to low fuel delivery. To establish the exact failure mode, the parts are then disassembled and the individual components inspected under microscope. This concluded that the injectors are contaminated with metal.



particles on nozzle needle



particles on valve seat

» **Remove the pump:** with evidence of contamination, the high-pressure pump is put through equally thorough checks. The tests confirmed, that this too, is contaminated with fine metal debris, caused by the high-pressure pump starting to fail.

» **Replace the pump and injectors** with either new OE or a cost and eco-friendly unit, from an OE-approved remanufacturer like Carwood.

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- **Flush the system** before the replacement parts are installed into the vehicle, to remove any trace of contamination. To do this, clean the fuel tank and low-pressure hydraulic pipework using traditional flushing methods and replace all high-pressure pipes, the rail assembly and fuel filters with new parts.

- **Before fitting the high-pressure pump**, ensure the pump and rail fittings are clean. Remember to pressurize the fuel system by turning the ignition key on, and check for leaks.

- **Recode the injectors into the vehicle ECU** to ensure that the timing and quantity of fuel delivered is calibrated for optimum performance. To do this, enter the newly-generated calibration code on each injector into the correct cylinder, using an EOBD tool. Repeat the process for other injectors, as required

- **Perform a relearn:** all Continental/VDO injectors have an ECU self-adaption process that needs to be performed after the injectors have been reprogrammed and fitted to the vehicle. This teaches the ECU the ideal pilot injection for the engine, in order to prevent engine knock.

- **Reconnect the scan tool**, clear all fault codes and take the vehicle for a short road test to confirm that the fault has been eliminated. Job done!

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