

VOLKSWAGEN

GROUP OF AMERICA

July 14, 2011

Jeffrey Quandt
Chief, Vehicle Control Division
Office of Defects Investigation
U.S. Department of Transportation
National Highway Traffic Safety Administration
1200 New Jersey Avenue S.E.
Washington, DC 20590

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GM - COMPLIANCE / TREAD TITLE
PRODUCT COMPLIANCE DEPARTMENT
248-754-5000 PHONE
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DECEMBER 01, 2010 DATE

Subject: PE10-034 NVS-213hkb: Engine Stall and/or Loss of Motive Power;
TDI Clean Diesel Engine

Dear Mr. Quandt:

Please find attached Volkswagen's response to your letter dated September 14, 2010 requesting information concerning engine stalling and/or loss of motive power, on certain 2009-2010 MY Volkswagen Jetta, 2010 MY Volkswagen Golf and 2010 MY Audi A3 vehicles equipped with the TDI Clean Diesel engine.

Thank you for your consideration in granting our requested extension to December 01, 2010.

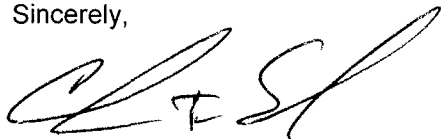
For your convenience, each request is restated verbatim and then followed by our response.

Please note, several documents related to question 8 are included in their original German language format and will be resubmitted upon completion of translation to English.

On a final note, be advised that Robert Bosch GmbH will provide responsive documents under separate cover, in addition to submitting a request for confidentiality.

Please contact me if you have any questions regarding this response.

Sincerely,



Christopher T. Sandvig
General Manager - Compliance/TREAD
Service and Quality

Attachments

VOLKSWAGEN GROUP OF AMERICA, INC.
3800 HAMLIN ROAD
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Request 1

State, by model and model year, the number of subject and peer vehicles VW has manufactured for sale or lease in the United States. Separately, for each subject and peer vehicle manufactured to date by VW, state the following:

- a. Vehicle identification number (VIN);
- b. Make;
- c. Model;
- d. Model Year;
- e. Date of manufacture;
- f. Date warranty coverage commenced; and
- g. The State in the United States where the vehicle was originally sold or leased (or delivered for sale or lease).

Provide the table in Microsoft Access 2000, or a compatible format, entitled "PRODUCTION DATA." See Enclosure 1, Data Collection Disc, for a pre-formatted table which provides further details regarding this submission.

Response 1

In response to your inquiry, Volkswagen has identified the following number of 2009-2010 Model Year (MY) Jetta, 2010 MY Golf and 2010 MY Audi A3 vehicles manufactured and sold to Volkswagen Group of America, Inc. for resale or lease in the United States that were equipped with a TDI Clean Diesel engine:

Subject Vehicles	MY 2009	MY 2010
VW Jetta	37,889	52,757
VW Golf	-	4,446
Audi A3	-	2,180

Please see Microsoft Excel file entitled "PRODUCTION DATA.xlsx" for responses to subparagraphs a) through g), in the folder attached hereto as Exhibit to Request 1.

Source: Business Objects Vehicles Universe

Date Gathered: Through the date of the inquiry

Exhibit to Request 1

PRODUCTION DATA

Data is provided labeled as “PRODUCTION DATA.xlsx” in Microsoft Excel format in the Exhibit to Request 1 folder on the PE10-034 Data Collection Disc

Request 2

State the number of each of the following, received by VW, or of which VW is otherwise aware, which relate to, or may relate to, the alleged defect in the subject and peer vehicles:

- a. Consumer complaints, including those from fleet operators;
- b. Field reports, including dealer field reports;
- c. Reports involving a crash, injury, or fatality, based on claims against the manufacturer involving a death or injury, notices received by the manufacturer alleging or proving that a death or injury was caused by a possible defect in a subject vehicle, property damage claims, consumer complaints, or field reports;
- d. Property damage claims;
- e. Third-party arbitration proceedings where VW is or was a party to the arbitration; and
- f. Lawsuits, both pending and closed, in which VW is or was a defendant or codefendant.

For subparts “a” through “d,” state the total number of each item (e.g., consumer complaints, field reports, etc.) separately. Multiple incidents involving the same vehicle are to be counted separately. Multiple reports of the same incident are also to be counted separately (i.e., a consumer complaint and a field report involving the same incident in which a crash occurred are to be counted as a crash report, a field report and a consumer complaint).

In addition, for items “c” through “f,” provide a summary description of the alleged problem and causal and contributing factors and VW’s assessment of the problem, with a summary of the significant underlying facts and evidence. For items “f” and “g,” identify the parties to the action, as well as the caption, court, docket number, and date on which the complaint or other document initiating the action was filed.

Response 2

a) In response to this inquiry, Volkswagen has identified 46 consumer complaints involving a diesel fuel system component related to the alleged defect in the subject vehicles.

A number of consumer complaints were reviewed that did not contain sufficient information to permit a determination as to whether the incident fell within the definition of “alleged defect” or that the analysis showed the incident to be attributable to a diesel fuel system component. These consumer complaints are nevertheless provided for the Agency’s review.

b) In response to this inquiry, Volkswagen has identified 157 field reports involving a diesel fuel system component related to the alleged defect in the subject vehicles.

A number of field reports were reviewed that did not contain sufficient information to permit a determination as to whether the incident fell within the definition of “alleged defect” or that the analysis showed the incident to be attributable to diesel fuel system related components. These field reports are nevertheless provided for the Agency’s review.

c) In response to this inquiry, Volkswagen has not received any reports involving a crash, injury or fatality, or notices/claims of injury or death alleging or proving that a death or injury was caused by the alleged defect in the subject vehicles. Volkswagen has not received any property damage claims, consumer complaints, or field reports involving or referring to a death or injury related to the alleged defect in the subject vehicles.

d) In response to this inquiry, Volkswagen has not identified any property damage claims.

e) In response to this inquiry, Volkswagen has not identified any third-party arbitration proceedings where VW is or was a party to the arbitration.

f) In response to this inquiry, Volkswagen has identified one closed lawsuit, in which VW is or was a defendant or codefendant. The customer also filed one of the VOQs.

Source: LISTEN, PL, FRED, ATA/VTA

Date Gathered: Through the date of the inquiry

Request 3

Separately, for each item (complaint, report, claim, notice, or matter) within the scope of your response to Request No. 2, state the following information:

- a. VW's file number or other identifier used;
- b. The category of the item, as identified in Request No. 2 (i.e., consumer complaint, field report, etc.);
- c. Vehicle owner or fleet name (and fleet contact person), address, and telephone number;
- d. Vehicle's VIN;
- e. Vehicle's make, model and model year;
- f. Vehicle's mileage at time of incident;
- g. Incident date;
- h. Report or claim date;
- i. Whether a crash is alleged;
- j. Whether property damage is alleged;
- k. Number of alleged injuries, if any; and
- l. Number of alleged fatalities, if any.

Provide this information in Microsoft Access 2000, or a compatible format, entitled "REQUEST NUMBER TWO DATA." See Enclosure 1, Data Collection Disc, for a pre-formatted table which provides further details regarding this submission.

Response 3

Responses to subparagraphs a) through l) are provided in two separate documents entitled, REQUEST NUMBER TWO DATA.xlsx and NON-SPECIFIC REQUEST NUMBER TWO DATA.xlsx, in the folder attached hereto as Exhibit to Request 3. These cases are organized by category then by case number.

Source, Date Gathered: See Response 2

Exhibit to Request 3

REQUEST NUMBER TWO DATA

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NON-SPECIFIC REQUEST NUMBER TWO DATA

Data is provided labeled as “REQUEST NUMBER TWO DATA.xlsx” and “NON-SPECIFIC REQUEST NUMBER TWO DATA.xlsx” in Microsoft Excel format in the Exhibit to Request 3 folder on the PE10-034 Data Collection Disc

Request 4

Produce copies of all documents related to each item within the scope of Request No. 2. Organize the documents separately by category (i.e., consumer complaints, field reports, etc.) and describe the method VW used for organizing the documents.

Response 4

In response to this inquiry, Volkswagen is providing copies of documents identified for each item in Response 2. The documents are provided in Adobe Acrobat format, entitled "REQUEST NUMBER FOUR DATA.pdf", in the folder attached hereto as Exhibit to Request 4. The cases are organized by category, then by case number.

Volkswagen is also providing copies of consumer complaints and field reports in which the case does not contain sufficient information for Volkswagen to make a determination as to whether the incident fell within the definition of "alleged defect" or that the incident is attributable to a diesel fuel system related component. The records are provided in Adobe Acrobat format, entitled "NON-SPECIFIC NUMBER FOUR DATA.pdf", in the folder attached hereto as Exhibit to Request 4. The cases are organized by category, then by case number.

Source, Date Gathered: See Response 2

Exhibit to Request 4

REQUEST NUMBER FOUR DATA

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NON-SPECIFIC NUMBER FOUR DATA

Data is provided labeled as “REQUEST NUMBER FOUR DATA.pdf” and “NON-SPECIFIC NUMBER FOUR DATA.pdf” in Adobe Acrobat format in the Exhibit to Request 4 folder on the PE10-034 Data Collection Disc

Request 5

State, by model and model year, a total count for all of the following categories of claims, collectively, that have been paid by VW to date that relate to, or may relate to, the alleged defect in the subject and peer vehicles: warranty claims; extended warranty claims; claims for good will services that were provided; field, zone, or similar adjustments and reimbursements; and warranty claims or repairs made in accordance with a procedure specified in a technical service bulletin or customer satisfaction campaign.

Separately, for each such claim, state the following information:

- a. VW's claim number;
- b. Vehicle owner or fleet name (and fleet contact person) and telephone number;
- c. VIN;
- d. Repair date;
- e. Vehicle mileage at time of repair;
- f. Repairing dealer's or facility's name, telephone number, city and state or ZIP code;
- g. Labor operation number;
- h. Problem code;
- i. Replacement part number(s) and description(s);
- j. Concern stated by customer; and
- k. Comment, if any, by dealer/technician relating to claim and/or repair.

Provide this information in Microsoft Access 2000, or a compatible format, entitled "WARRANTY DATA." See Enclosure 1, Data Collection Disc, for a pre-formatted table which provides further details regarding this submission.

Response 5

In response to this inquiry, Volkswagen has identified 264 warranty claims involving a diesel fuel system component related to the alleged defect in the subject vehicles. Volkswagen notes that 4 of these claims are duplicative of the provided VOQs; 21 are duplicative of consumer complaints and 146 are duplicative of field reports.

Information for these claims is provided in Microsoft Excel format, entitled "WARRANTY DATA.xlsx", in the folder attached hereto as Exhibit to Request 5. The claims are organized by claim number.

Source: Business Objects Warranty Universe

Date Gathered: Through the date of the inquiry

Exhibit to Request 5

WARRANTY DATA

Data is provided labeled as “WARRANTY DATA.xlsx” in Microsoft Excel format in the Exhibit to Request 5 folder on the PE10-034 Data Collection Disc

Request 6

Describe in detail the search criteria used by VW to identify the claims identified in response to Request No. 5, including the labor operations, problem codes, part numbers and any other pertinent parameters used. Provide a list of all labor operations, labor operation descriptions, problem codes, and problem code descriptions applicable to the alleged defect in the subject vehicles. State, by make and model year, the terms of the new vehicle warranty coverage offered by VW on the subject vehicles (i.e., the number of months and mileage for which coverage is provided and the vehicle systems that are covered). Describe any extended warranty coverage option(s) that VW offered for the subject vehicles and state by option, model, and model year, the number of vehicles that are covered under each such extended warranty.

Response 6

In order to respond to this inquiry, the following search criteria were used to search the Warranty Claims data to identify claims in response to Request 5:

- Identify all diesel fuel related system components which retains, transfers, manages and/or directs the flow of diesel fuel in the subject vehicles
- All 2009-2010 MY Volkswagen Jetta, 2010 MY Volkswagen Golf and 2010 MY Audi A3 vehicles equipped with a TDI Clean Diesel engine, manufactured and sold to Volkswagen Group of America, Inc. for resale or lease in the United States

The individual warranty claims were then manually screened to identify those which contained customer concerns related to the alleged defect and which diesel fuel system component(s) were replaced.

The following is a list, by model year and model, of the terms of the New Vehicle Limited, Powertrain Limited and California Emission warranty coverages offered by Volkswagen on the subject vehicles:

Volkswagen	2009	Jetta/Jetta Sportwagen TDI 36 Months / 36,000 miles	Bumper to Bumper
Volkswagen	2010	Jetta/Jetta Sportwagen/Golf TDI 36 Months / 36,000 miles	Bumper to Bumper
Audi	2010	A3 TDI 48 Months / 50,000 miles	Bumper to Bumper
Volkswagen	2009	Jetta/Jetta Sportwagen TDI 60 Months / 60,000 miles	Powertrain Limited Warranty
Volkswagen	2010	Jetta/Jetta Sportwagen/Golf TDI 60 Months / 60,000 miles	Powertrain Limited Warranty
Volkswagen / Audi	2009 - 2010	Jetta / Jetta Sportwagen / Golf / A3 TDI 84 Months / 70,000 miles	California Emissions Warranty

Volkswagen does not offer any other extended warranty covering the subject components on the subject vehicles.

Source: VWGoA

Date Gathered: Through the date of the inquiry

Request 7

Produce copies of all service, warranty, and other documents that relate to, or may relate to, the alleged defect in the subject and peer vehicles, that VW has issued to any dealers, regional or zone offices, field offices, fleet purchasers, or other entities. This includes, but is not limited to, bulletins, advisories, informational documents, training documents, or other documents or communications, with the exception of standard shop manuals. Also include the latest draft copy of any communication that VW is planning to issue within the next 120 days.

Response 7

In response to this inquiry, Volkswagen is providing copies of the requested documents in Adobe Acrobat format, in the folder attached hereto as Exhibit to Request 7.

Source: VWGoA

Date Gathered: Through the date of the inquiry

Exhibit to Request 7

Data is provided in Adobe Acrobat format in the Exhibit to Request 7 folder on the PE10-034 Data Collection Disc

Request 8

Describe all assessments, analyses, tests, test results, studies, surveys, simulations, investigations, inquiries and/or evaluations (collectively, “actions”) that relate to, or may relate to, the alleged defect in the subject and peer vehicles that have been conducted, are being conducted, are planned, or are being planned by, or for, VW. For each such action, provide the following information:

- a. Action title or identifier;
- b. The actual or planned start date;
- c. The actual or expected end date;
- d. Brief summary of the subject and objective of the action;
- e. Engineering group(s)/supplier(s) responsible for designing and for conducting the action; and
- f. A brief summary of the findings and/or conclusions resulting from the action.

For each action identified, provide copies of all documents related to the action, regardless of whether the documents are in interim, draft, or final form. Organize the documents chronologically by action.

Response 8

Volkswagen has identified 26 reports that relate to, or may relate to, the alleged defect in the subject vehicles.

In addition, Volkswagen is including 34 internal inquires/communications that relate to, or may relate to, the alleged defect in the subject vehicles. Volkswagen is providing copies of all documents for the Agency’s review.

A table outlining each item in a) through f) is provided in an Adobe Acrobat file format, entitled “REQUEST NUMBER EIGHT DATA.pdf”, in the folder attached hereto as Exhibit to Request 8.

Volkswagen provides copies of the requested documents in an Adobe Acrobat file format, in the folder attached hereto as Exhibit to Request 8.

Source: Volkswagen

Date Gathered: Through the date of the inquiry

Exhibit to Request 8

Data is provided in Adobe Acrobat format in the Exhibit to Request 8 folder on the PE10-034
Data Collection Disc

Request 9

Describe all modifications or changes made by, or on behalf of, VW in the design, material composition, manufacture, quality control, supply, or installation of the subject component, from the start of production to date, which relate to, or may relate to, the alleged defect in the subject and peer vehicles. For each such modification or change, provide the following information:

- a. The date or approximate date on which the modification or change was incorporated into vehicle production;
- b. A detailed description of the modification or change;
- c. The reason(s) for the modification or change;
- d. The part number(s) (service and engineering) of the original component;
- e. The part number(s) (service and engineering) of the modified component;
- f. Whether the original unmodified component was withdrawn from production and/or sale, and if so, when;
- g. When the modified component was made available as a service component; and
- h. Whether the modified component can be interchanged with earlier production components.

Also, provide the above information for any modification or change that VW is aware of which may be incorporated into vehicle production within the next 120 days.

Response 9

In response to this inquiry, Volkswagen is providing a table outlining each item in a) through h) in an Adobe Acrobat file, entitled "REQUEST NUMBER NINE DATA.pdf", in the folder attached hereto as Exhibit to Request 9.

Source: VWAG

Date Gathered: Through the date of the inquiry

Exhibit to Request 9

REQUEST NUMBER NINE DATA

Data is provided labeled as “REQUEST NUMBER NINE DATA.pdf” in Adobe Acrobat format in the Exhibit to Request 9 folder on the PE10-034 Data Collection Disc

Request 10

State the number of each of the following that VW has sold that may be used in the subject and peer vehicles by component name, part number (both service and engineering/production), model and model year of the vehicle in which it is used and month/year of sale (including the cut-off date for sales, if applicable):

- a. Subject component; and
- b. Any kits that have been released, or developed, by VW for use in service repairs to the subject component/assembly.

For each component part number, provide the supplier's name, address, and appropriate point of contact (name, title, and telephone number). Also identify by make, model and model year, any other vehicles of which VW is aware that contain the identical component, whether installed in production or in service, and state the applicable dates of production or service usage.

Response 10

In response to this inquiry, Volkswagen is providing a table outlining each item in subparagraph a) in an Adobe Acrobat file, entitled "REQUEST NUMBER TEN DATA_PART SALES.pdf" in the folder attached hereto as Exhibit to Request No. 10.

Volkswagen notes that no kits have been developed or released for use in service repairs to the diesel fuel system, per subparagraph b).

Additionally, in response to this inquiry, Volkswagen is providing supplier identification and point of contact information in an Adobe Acrobat file format, "REQUEST NUMBER TEN DATA_SUPPLIER.pdf", in the folder attached hereto as Exhibit to Request 10.

Source: Volkswagen

Date Gathered: Through the date of the inquiry

Exhibit to Request 10

REQUEST NUMBER TEN DATA_PART SALES

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REQUEST NUMBER TEN DATA_SUPPLIER

Data is provided in Adobe Acrobat format in the Exhibit to Request 10 folder on the PE10-034
Data Collection Disc

Request 11

Furnish VW's assessment of the alleged defect in the subject vehicle, including:

- a. The causal or contributory factor(s);
- b. The failure mechanism(s);
- c. The failure mode(s);
- d. The risk to motor vehicle safety that it poses;
- e. What warnings, if any, the operator and the other persons both inside and outside the vehicle would have that the alleged defect was occurring or subject component was malfunctioning; and
- f. The reports included with this inquiry.

Response 11

Volkswagen has found no defect related to motor vehicle safety with relation to the TDI Clean Diesel fuel system at issue in this investigation. Rather, after a detailed internal inquiry, which started earlier this year and prior to NHTSA's present preliminary evaluation, Volkswagen has determined that gasoline contaminated diesel fuel is the reason for the subject customer issues. Of about 50 diesel fuel samples taken from complaint vehicles beginning this summer as part of a broad look at the same issues and concerns raised recently by NHTSA, Volkswagen found that nearly 90%, or 43 samples, contained high amounts of gasoline.

Gasoline accidentally introduced into the subject Volkswagen diesel engine explains the type and nature of complaints at issue in this evaluation. The key is understanding that diesel fuel serves not only as the combustion source of the vehicle's engine but also as the lubricant of the high pressure fuel pump (HPFP). As explained in detail below, even a small amount of gasoline in the diesel fuel may disrupt the necessary lubrication required and may cause the HPFP to fail.

Volkswagen has not identified any reports of accidents, crashes and/or injuries possibly related to the alleged defect. Volkswagen received notice of one lawsuit, subsequently withdrawn on September 02, 2010, in which the claimant was found to have consistently used agricultural diesel fuel in his vehicle.

Volkswagen finally notes that the history of the TDI Clean Diesel fuel system includes known manufacturing process issues related to the HPFP during early production which may have led to a limited number of TDI Clean Diesel fuel system failures. The initial manufacturing concerns were resolved during the ramp up to full production of the HPFP.

What is High Pressure Common Rail Diesel Technology?

Diesel fuel systems have evolved dramatically since the early passenger vehicle diesel designs of the 1980's. Greater sophistication of the technology has met the demand for increased fuel economy, reduced emissions, and quieter operation while delivering solid performance.

Common rail diesel engines with high pressure injection technology were developed and introduced to deliver a more environmentally sensitive vehicle with increased performance when compared to former diesel or current gasoline engine concepts.

Even when compared to today's gasoline engines, the diesel engine provides great performance with high fuel efficiency and low emissions. For example, the Volkswagen TDI Clean Diesel engine in the Jetta provides 140HP and a torque of 236 lb-ft with fuel economy of 30/42 mpg¹ - while the currently available gasoline engines offer either 115HP and 125 lb-ft and fuel economy of 23/29 mpg or 170HP and 177 lb-ft and a fuel economy of 23/31 mpg. The diesel engine here provides more than 30% greater fuel economy. Indeed, the 2009 MY Jetta TDI and the 2010 MY Audi A3 TDI respectively were honored as the 2009 / 2010 Green Car of the Year.

Common Rail & High Pressure Fuel Pump Technology

Volkswagens' TDI Clean Diesel system operates under an extremely high fuel injection pressure (up to 1,800 bar / 26,107 psi) to ensure optimal power and clean combustion.

Piezo-style injectors enable several fuel injections during one combustion cycle, producing a smooth running engine with precise emissions control. The substantial injection pressure is one of the key factors to achieve the solid performance of the TDI Clean Diesel engine. The HPFP is the primary fuel system component which boosts the diesel fuel to the high pressures required, prior to delivery to the "common rail," a pressure storage tank, that in turn distributes the diesel fuel to each of the 4 fuel injectors (Reference - Image 1). The "common rail" is equipped with both a pressure sensor and a regulation valve to adapt the fuel injection pressure to the actual value required for optimum efficiency and performance, dependent on engine load and speed.

¹ City/Highway Estimates – 2010 Model Year Source: www.fueleconomy.gov

Image 1 displays the schematic of Volkswagen’s TDI Clean Diesel “common rail” system. (Please note that “fuel” always refers to diesel fuel unless otherwise stated.)

In addition, Volkswagen submits to NHTSA as part of this response, copies of the Self Study Programs (Reference - Included in Response to Request # 7) for the Agency’s reference, providing greater detail about the properties and operation of the TDI Clean Diesel “common rail” system engines.

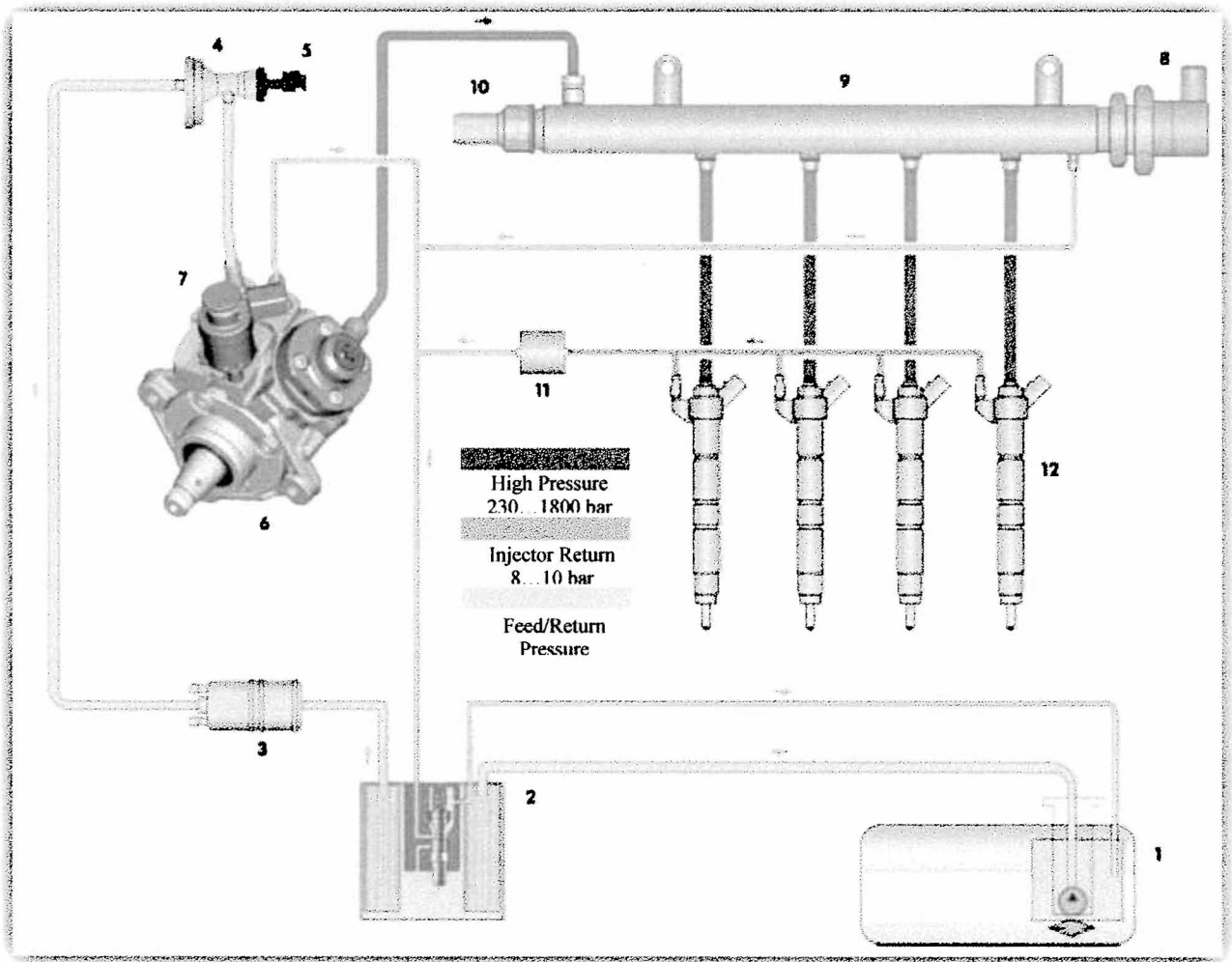


Image 1 – Fuel System Schematic

The principal components of the TDI Clean Diesel fuel system are (Reference – Image 1):

- 1) Fuel delivery unit (in-tank fuel pump)
- 2) Fuel filter with pre-warming valve
- 3) In-line fuel pump (or auxiliary pump)
- 4) Strainer (included in the fuel metering unit, #7 below)
- 5) Fuel temperature sensor
- 6) High pressure fuel pump (HPFP)
- 7) Fuel metering unit
- 8) Pressure regulation valve
- 9) Common rail
- 10) Pressure sensor
- 11) Pressure retention valve
- 12) Injectors

The in-tank fuel pump¹ delivers the diesel fuel from the fuel tank to the fuel filter², located within the engine compartment. A secondary “in-line” fuel pump³ provides additional pressure to the feed line. The fuel passes a fuel temperature sensor⁵ and enters the HPFP⁶ through a strainer⁴. The HPFP increases the fuel pressure up to 1,800 bar / 26,107 psi and feeds the fuel to the “common rail.”⁹ The actual pressure inside the common rail is controlled by a pressure sensor¹⁰ and a regulation valve⁸, depending on engine operating load and fuel demand requirements. The engine control unit operates the fuel injectors¹² and provides for multiple injections (when necessary) during one combustion cycle. Excess fuel is returned via return lines to the fuel filter. The pressure retention valve¹¹ in the return line provides a reference pressure for each injector during operation and prevents the injectors from running dry (fuel being drained from the line) when the engine is off. Inside the fuel filter², a temperature valve determines whether fuel is redirected to either the HPFP or to the fuel tank, dependent on operating and ambient temperatures.

How Does the High Pressure Fuel Pump Work?

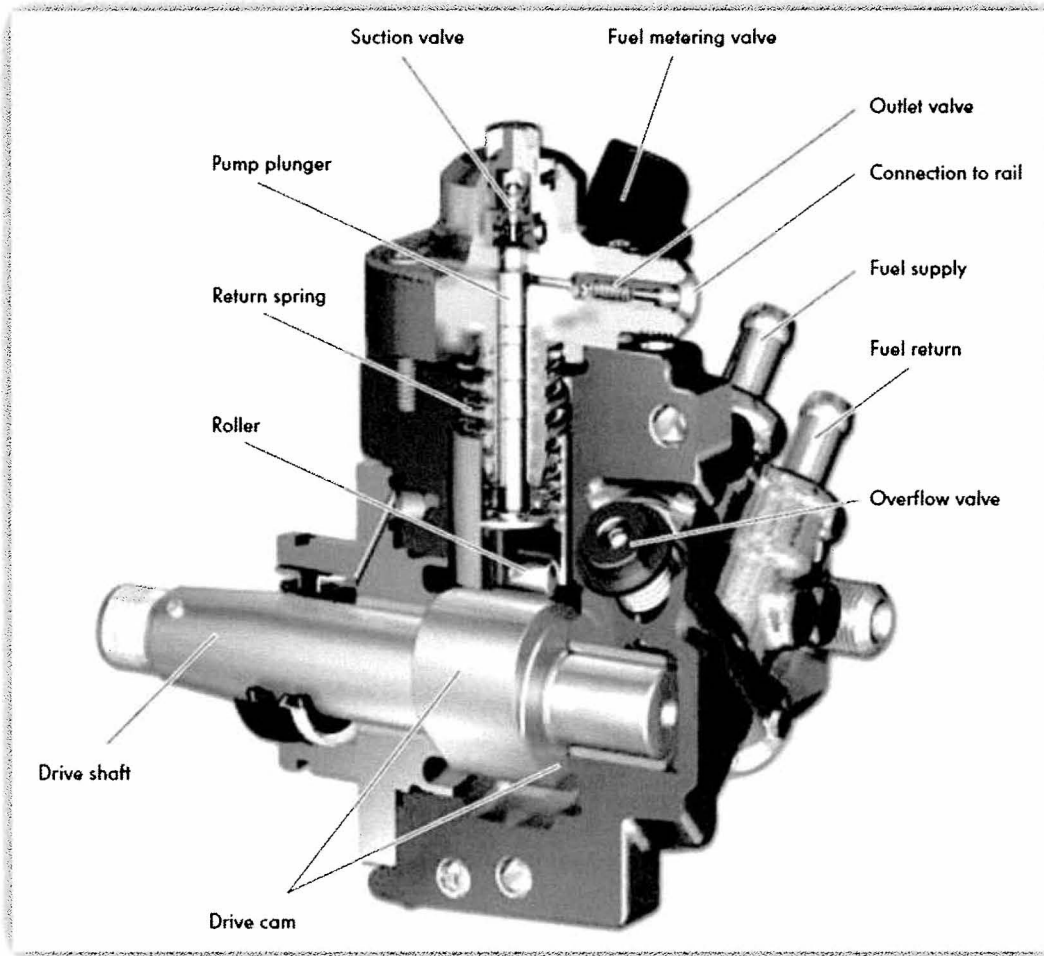


Image 2 – High Pressure Fuel Pump – Cut-away Model

Image 2 shows a cut-away model of the HPFP and displays the internal components. The basic design of the HPFP is a radial piston pump.

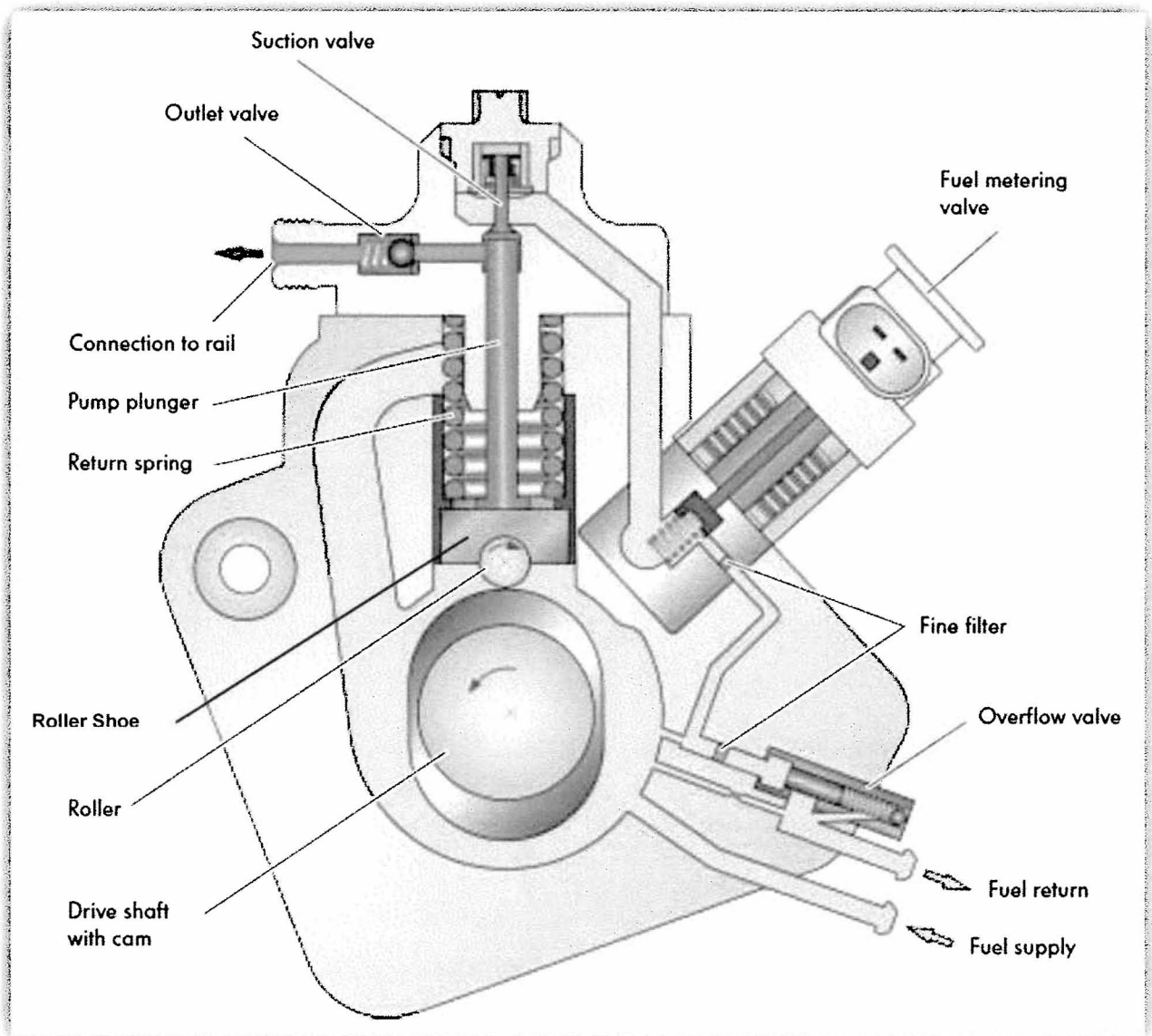


Image 3 – High Pressure Fuel Pump - Schematic

Image 3 displays the operation of the HPFP.

The pump is driven by a dual lobe camshaft. The camshaft is in constant contact with a roller, which is retained in position by a spring loaded roller shoe. The roller shoe provides the contact point between the roller and pump plunger. One revolution of the camshaft provides two actuations of the pump plunger.

Well-lubricated operation of this shoe/roller/cam contact is vital to the pump's mechanism and, as discussed later, an area directly impacted by gasoline contamination in the diesel fuel supply.

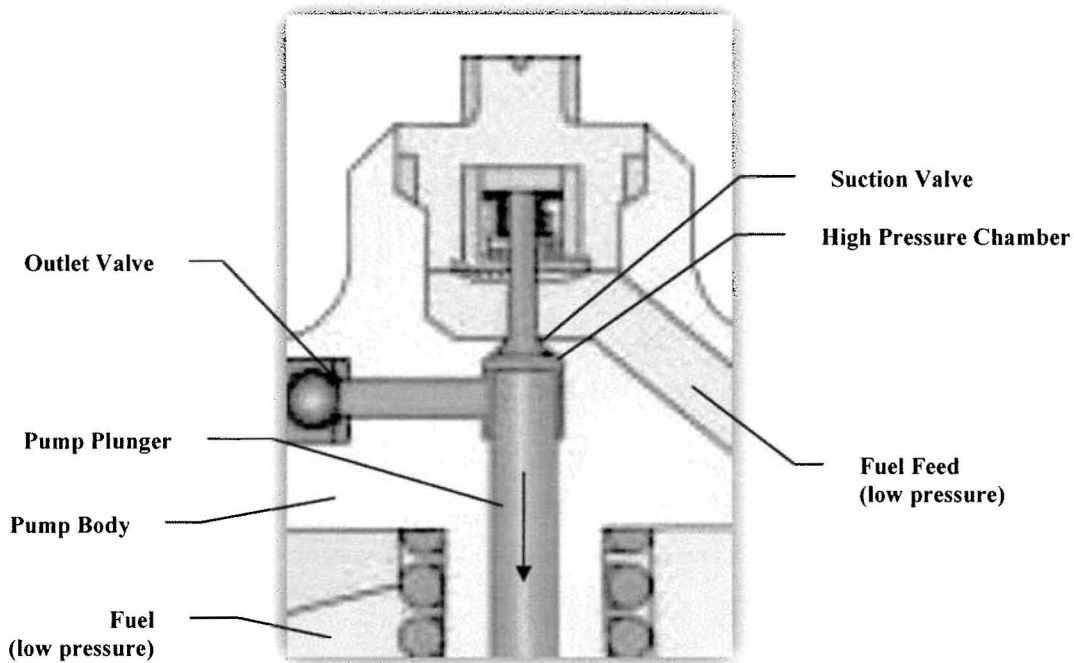


Image 4 – High Pressure Fuel Pump – High Pressure Chamber Detail

Image 4 displays the high pressure chamber of the HPFP in detail. As the plunger moves down (in the direction of the arrow), the suction valve opens and draws fuel into the high pressure chamber. As the camshaft lobe drives the plunger up, the suction valve closes, raising the pressure of the fuel within the high pressure chamber. The outlet valve then opens, feeding the high pressure fuel to the “common rail.”

Due to the extreme operating pressure in the high pressure chamber and the pressure gradient to the low pressure area at the pump’s drive, a certain amount of fuel passes between the pump plunger and the pump body. As such, it is not technologically feasible to insert a gasket that would withstand that pressure level and gradient. A separate oil lubrication and cooling circuit in the HPFP is, therefore, not possible as the diesel fuel and oil would mix. The engineering solution has been to design one fluid circuit in which the diesel fuel serves as not only the fuel for the engine but also as the lubricant and cooling agent for the HPFP. Accordingly, the surfaces and loads inside the HPFP are designed to the lubricating properties of Ultra Low Sulfur Diesel (ULSD) Fuel No. 2 meeting the ASTM D-975 standard.

Thus, the use of the correct specification diesel fuel is a vital factor for the operation of the HPFP, as the diesel fuel provides the lubricant – just as the use of the correct engine oil is vital for the proper lubrication of an engine.

Diesel Fuel Requirements as Provided in the Owner's Manual

As the diesel fuel quality is so important, the Owner's Manual clearly provides that the commonly available ULSD Fuel No. 2, meeting the ASTM D-975 standard, is the correct fuel that must be used for Volkswagen and Audi vehicles equipped with the TDI Clean Diesel engines² (Reference – Attachment in Response to Request # 11 - Volkswagen / Audi Owner's Manual). The Owner's Manual informs the customer that the engine was specifically designed to operate only on ULSD fuel and warns never to use regular gasoline or heating oil, or products such as "starting assist fluids" or "fuel-line antifreeze" (offered for gasoline engines).

The customer is also reminded to use only ULSD fuel through a "Diesel" label on the fuel filler door, the fuel tank cap, and a sticker located near the headlight switch in the passenger compartment (Reference – Attachment in Response to Request # 11 – Diesel Requirement Info).

The Owner's Manual clearly states when operating the engine on fuels other than the specified ULSD fuel, the properties of those fuels can cause serious damage to the diesel fuel injection system and engine, which may cause expensive repairs and may adversely affect the New Vehicle Limited Warranty.

While the subject HPFP was successfully tested even with certain diesel fuels outside of the ASTM D-975 specification, gasoline contamination of the diesel fuel cannot be tolerated in the fuel system. Customers are therefore clearly instructed never to use any gasoline.

Failure Mechanism / Failure Mode

Gasoline contamination destroys the lubricity of the diesel fuel required by the HPFP and will lead to damage and failure of the component. As discussed above, active parts of the HPFP such as the camshaft lobe, roller and roller shoe require lubrication by the diesel fuel. The roller spins on the camshaft lobe and slides in the roller shoe building up a hydrodynamic lubrication film that separates the components' surfaces. Without the proper lubrication of these surfaces, the components will grind and wear. With increasing wear, the roller will no longer slide in the roller shoe and instead stick or bind. The roller will then also no longer spin on the camshaft lobe and similarly start to slide and bind. The resulting failure is excessive wear and flat spots on the roller and camshaft lobe surfaces. Part analyses indicate a sticking roller may also turn the roller shoe out of position in relation to the camshaft lobe, leading to further acceleration of roller wear. With progression of the wear, metallic particles can be shaved off and the return lines will circulate those particles throughout the fuel system. Such HPFP failures require a complete replacement of the fuel system because this metallic debris could spread to the pumps, filters, injectors, and fuel tank.

Strainers and filters inside the HPFP prevent a certain amount of these particles from reaching the suction valve (Reference - Image 4), but if the strainer is overloaded, particles may block the suction valve and keep it open, preventing the generation of high pressure in the pressure

² Diesel fuel surveys conducted twice a year by the Alliance of Automobile Manufacturers, show that samples taken during the survey periods generally meet the ASTM D-975 standard.

chamber. As a consequence, the engine could stall when the rail is no longer fed with fuel, the pressure collapses and fuel is no longer supplied to the injectors.

External laboratory test results identify that ULSD fuel with a 1% gasoline contamination will already reduce the diesel fuel's flashpoint outside the ASTM D-975 specification and will degrade the effectiveness of the diesel fuel lubricity to a range that can cause serious damage (Reference – Attachment in Response to Request # 11 – Flashpoint Analysis). Accordingly, warnings and clear instructions are included in the Owner's Manual.

In addition, certain fault codes are associated with the fault condition of gasoline contaminated diesel fuel:

- P0087 fuel system rail pressure too low
- P0191 fuel rail pressure sensor circuit – range performance

Damage caused by wear, even when excessive, typically develops over time. It is noted that current HPFP failures potentially could have been the result of a previous gasoline contamination of the diesel fuel at some time prior to the failure, as indicated by diesel fuel samples taken at time of failure finding diesel fuel that is within specification. However, Volkswagen notes in the majority of cases in which a sample was taken at the time of the failure there was found to be gasoline contamination of the diesel fuel.

Warnings / Notification to the Customer / VOQs

The driver will be alerted about the failure of the HPFP through the illumination of the MIL and/or glow plug lamp, rough idle, rough running engine and reduced engine performance. As the HPFP is damaged by a wear condition, sudden engine failure and/or shutdown is unlikely. If these warning signs are ignored, the metallic particles may ultimately block the HPFP suction valve, causing the vehicle to stall. Depending on the amount of gasoline contaminating the diesel fuel, the failure of the HPFP can happen within one fuel tank filling which equals up to approximately 500 miles.

Volkswagen notes that the VOQs provided with the inquiry indicated that customers acknowledged warning light illumination and reduced engine power prior to the failure of the HPFP.

Analysis of the Data and Reports Provided with the Inquiry

To identify the fuel system components that possibly cause stalling and/or loss of power, the warranty claims provide detailed information about the replaced parts in service of the fuel system.

Volkswagen identified 467 incidents where stalling or loss of power was alleged including: 264 warranty claims; 46 consumer complaints; and 157 field reports.

Analysis of the 264 warranty claims show the HPFP to be the primary cause of the customer's concern in 154 cases. Other significant TDI Clean Diesel fuel components involved the following numbers of warranty claims: 32 incidents were related to an injector; 22 incidents were related to the pressure retention valve; 20 incidents were related to the fuel filter element; 14 incidents were related to the common rail pressure sensor and/or pressure regulation valve; 12 incidents were related to the in-tank fuel pump; and 4 incidents were related to the secondary in-line fuel pump. The remaining 6 incidents, spread among 5 different components, appear to be unique events and are set aside from the analysis, but are nevertheless included in the warranty file for the Agency's review.

The history of the TDI Clean Diesel fuel system includes identified manufacturing process issues related to the HPFP during early production which may have led to a limited number of fuel system failures. The initial manufacturing concerns were resolved during the ramp up to full production. The incident rate shows a maximum peak at 15 R/1000 for the HPFP in the first month of US vehicle production. However, the overall rate of HPFP failure is about 1.6 R/1000.

Taking all claims into consideration for the whole population, a rate of 2.7 R/1000 can be calculated if no actual cause is considered.

Volkswagen has further identified 125 incidents of acknowledged mis-fueling and those records are provided for the agency's review (Reference – Attachment in Response to Request # 11 - MIS-FUEL REQUEST NUMBER ELEVEN DATA.xlsx).

Findings

High pressure fuel pump (HPFP)

In March 2010, Volkswagen initiated an analysis regarding complaints related to HPFPs. The initial data indicated early failure of HPFPs in vehicles within the first 0 to 3 months in service. The stated concerns were related to "no-start" or "reduced performance" conditions. As part of Volkswagen's standard quality control process, 27 pumps were sent to the supplier's lab for analysis (Reference – Please refer to separate submission of "8D" laboratory reports provided by Bosch under request for confidentiality). The results were as follows:

- 8 pumps proved to be fully functional and without damage
- 5 failures were due to fuel quality issues (corrosion by water, resinified residue from over-aged biodiesel)
- 14 were suspected to be caused by manufacturing faults at early production (coating faults / metallic spillings in coating)

A similar HPFP was used in Europe prior to the release for US production. The HPFP for use in the US improved on this earlier design to address manufacturing process issues and account for US-specific fuel quality and standards. The changes incorporated in the development process of the US HPFP are referenced in some documents provided as part of this response as "countermeasure" or "improved parts." Nevertheless, not all manufacturing issues were entirely resolved prior to the start of production for the US and some early concerns had to be addressed

during ramped up production. These improvements included some additional measures implemented during early MY2009 production (Reference – Bosch report BSA000001085-001 provided separately by Bosch under request for confidentiality).

In March 2009, the manufacturing process for the carbon coating on the roller ends was changed. The former electrical coating process caused a blemish on the running surface where the electrical current was induced. By changing to a plasma coating process, the blemishing was eliminated, which in consequence enhanced the properties of the tribological system by reducing the roughness of the contact surface. The HPFPs resulting from this improvement would have been available to final vehicle assembly approximately in June 2009, at the beginning of 2010 MY production (Reference – Attachment in Response to Request # 8 – Action 8-23 and Bosch report BSA000001085-001 provided separately by Bosch under request for confidentiality).

Aside from these improvements to the HPFP addressing the manufacturing issues, fuel contamination remained the major cause of HPFP and related fuel system failures. Accordingly, a Technical Service Bulletin was issued in May 2010, instructing workshops to inspect the diesel fuel and to take appropriate steps with any warranty service in the event contamination was the cause (Reference – Attachments in Response to Request # 7 – VW TB V011011 2023624 and Audi TB A011008 2023360-1; Attachment in Response to Request # 8 - Action 8-61; Action 8-62; Action 8-66; Action 8-71).

Another robustness/durability improvement was just introduced into HPFP production in week 45, 2010 as part of the continuous quality optimization process. Play was reduced and surface finish was further optimized to improve the hydraulic lubrication film in the roller/shoe/cam contact to tolerate short time fuel deviations, such as out of specification or low quality ULSD fuel. It is important to note, however, that the HPFP was designed to the properties of ULSD, according to ASTM D-975, and thus cannot operate with gasoline contaminated diesel fuel - at issue here.

As analysis of failed parts continued to support the concern with fuel contamination, Volkswagen decided to purchase specific testing equipment in August 2010 for precise and timely identification of fuel contamination for the workshops without the need for a time consuming analysis in a testing laboratory.

Attachment (Reference – Attachment in Response to Request # 8 – Action 8-79) provides a table with the results of those analyses. The table shows the content of gasoline, biodiesel and water (in parts per million (ppm)) for 3 repeated measurements per sample.

The table shows the results for 49 vehicles' samples as follows:

- In 4 cases the customer stated or admitted to have used gasoline instead of diesel
- In 2 instances gasoline was used by mistake at a dealership sales department or during pre-delivery inspection
- In 43 cases, a sample was taken and analyzed from the fuel tank of the affected vehicle
 - Only 6 samples showed no or negligible amounts of gasoline in the sample, while one showed approximately 2.5% water in the fuel
 - The remaining 37 samples clearly showed average contamination of 8.5% gasoline in the diesel fuel³

In summary, nearly 90% of the vehicles evidenced gasoline contaminated diesel fuel to be the cause of the failure.

Applying that 90% to the overall rate of 2.7 R/1000, the rate then drops to about 0.27 R/1000 that may have been caused by manufacturing issues or a HPFP that had been damaged through a previous fueling with gasoline contaminated diesel fuel.

Reports

Volkswagen provides in this response a number of reports from the supplier's laboratory relating to the analysis of allegedly faulty HPFPs. While the supplier accepted responsibility for a number of those claims, the recent results discussed here showing significant gasoline contamination in the diesel fuel may shed new light on the cases associated with carbon coating or metallic spilling from the production process. It is important also to note that the supplier reports contain indications of rust/corrosion by water (Reference – Please refer to separate submission of “8D” laboratory reports provided by Bosch under request for confidentiality – Action 8-24; Action 8-26) and resinified residue from over-aged biodiesel (Reference – Please refer to separate submission of Bosch reports provided under request for confidentiality – Action 8-29; Action 8-30), both indications of other fuel contamination in 5 out of 27 supplier analyses. In other cases (8 out of 27 parts analyzed), the pumps were found to be in good operating order (Reference – Please refer to separate submission of “8D” laboratory reports provided by Bosch under request for confidentiality – Action 8-25; Action 8-32; Action 8-33).

Vaporization of Gasoline

Apart from the impact gasoline contamination has on the lubricity of the diesel fuel, vaporization of gasoline in the fuel system would also explain certain issues observed in the subject engines. The high temperatures in the fuel system, 80-90°C (176-194°F) can vaporize gasoline, but not diesel fuel, and create gas bubbles in areas with low fuel pressure. Such gas bubbles could affect the operation of the metering unit of the HPFP, which monitors and controls fuel supply in relation to engine load, speed and rail pressure. This could lead to inconsistencies in the fuel supply and trigger fault codes.

³ If gasoline is detected in the sample, a displayed “water” content could be ethanol contained in the gasoline because water and ethanol share the same infrared band. In cases of non-gasoline contaminated diesel, the measurement would actually be water content.

The fault codes possibly associated with the gas bubble condition are:

- P0087 - fuel system rail pressure too low
- P0191 - fuel rail pressure sensor circuit – range performance
- P0201/202/203/204 - injector cylinder 1/2/3/4 electrical fault/interrupted
- P0263 - deviation of fuel amount
- P020A/B/C/D - injection time cylinder 1/2/3/4 out of tolerance

Volkswagen suspects that, when the vehicle was brought into the workshop, the technician attempted to identify the concern based on these fault codes and replaced parts assumed to be the cause. The vast majority of the replaced parts, however, were later found to be fully functional when analyzed.

Injectors

32 injectors have been analyzed after an alleged failure. 30 were determined to be fault free, while 2 showed o-ring/gasket particles blocking the return line (Reference – Attachment in Response to Request # 8 – Action 8-08). The 30 injectors found to be without fault could have been associated with unnecessary replacements because of trouble codes stored in the engine control unit. The 2 injectors showing gasket particles were from early in the production of the subject vehicles. The issue was immediately detected and remedied by process changes at the supplier (Reference – Attachment in Response to Request # 8 – Action 8-08 and Action 8-16 provided by Bosch under request for confidentiality). Gasket particles caused by improper manufacturing by the supplier would be present from the outset of service and lead to an early failure without any future risk to motor vehicle safety.

Fuel Pressure Sensor (at Rail)

11 sensors have been analyzed after an alleged failure, all of which have been determined to be fault free (Reference – Attachment in Response to Request # 8 – Action 8-19). Again, the sensors appear to have been replaced unnecessarily because of trouble codes stored in the engine control unit.

Pressure Regulation Valve (at Rail)

7 valves were analyzed after an alleged failure. 6 of the valves were determined to be fault free (and likely to have been replaced because of fault codes), while 1 was found to be functional but with debris in the attached filter. In the instance of debris in the filter, undetermined fuel contamination was suspected as cause (Reference – Attachment in Response to Request # 8 – Action 8-18).

Pressure Retention Valve (Injector Return Line)

Some cases of pressure retention valve replacements have been reported, however, no analyses have been identified by Volkswagen.

Fuel Filter Replacements

Volkswagen identified 20 replacements of the fuel filter element only, at an average of 12,000 miles. Volkswagen submits that such “clogged” filters are an additional indication of bad or contaminated fuel, for example containing biodiesel content far above the ASTM D-975 specification, with the risk of aging and hygroscopic properties.

Lawsuit identified under Request 2

The dealership reported that the pump in the fuel tank of the customer’s vehicle failed in early January 2010. The workshop detected red-dyed agricultural or off road diesel in the fuel tank which was confirmed by the customer. Additionally, sediments, rust and moisture were found in a fuel sample taken by the dealership. The fuel filter also showed rust and silt. Volkswagen repaired the vehicle under goodwill (as the fuel contamination placed the matter outside the New Vehicle Limited Warranty), but refused to extend goodwill service when the customer presented the vehicle again several weeks later with the same problem. The customer started a lawsuit in early 2010 but ultimately the action was dropped. This customer also filed a VOQ with NHTSA in July 2010. Documents related to this lawsuit are included in the Response to Request 4.

Conclusion

Volkswagen has not identified any unreasonable risk to motor vehicle safety related to the alleged defect in the subject vehicles.

Based on laboratory results of a variety of replaced TDI Clean Diesel fuel system parts, Volkswagen determined the underlying cause of customer concerns related to engine stalling and/or loss of motive power in TDI Clean Diesel equipped vehicles, to gasoline contaminated diesel fuel. Of about 50 diesel fuel samples taken from complaint vehicles beginning this summer as part of a broad look at the issues and concerns raised here by NHTSA, Volkswagen found that nearly 90%, or 43 samples, contained substantial amounts of gasoline. Gasoline accidentally introduced into the subject Volkswagen diesel engine explains the type and nature of complaints at issue in this evaluation. The gasoline degrades the lubrication required from the diesel fuel by the HPFP.

Volkswagen has found no defect related to motor vehicle safety with relation to the fuel system at issue in this investigation. Volkswagen developed and designed the engine, the injection system and especially the HPFP to the ASTM D-975 standard for diesel fuel. As explained above, the common rail diesel fuel technology, including the HPFP, cannot tolerate gasoline contamination as found in the subject complaint vehicles. The vast majority of failures evaluated by Volkswagen were caused by outside influence and gasoline contaminated diesel fuel and not related to a manufacturing or design defect of the subject components or vehicles.

Exhibit to Request 11

Data is provided in Adobe Acrobat format in the Exhibit to Request 10 folder on the PE10-034
Data Collection Disc

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Action Title	Actual or Planned Start Date	Actual or Expected End Date	Subject and Objective Summary	Engineering Group(s)/Supplier(s) Responsible	Summary of Findings and/or Conclusion
0003724013	7/20/2010	7/20/2010	Component analysis of pressure regulation valve	Volkswagen	Component without problem in component analysis, therefore analysis in test vehicle, currently no final outcome
Action 8-1	09/07/2010	09/07/2010	Mis-fueled TDI	Volkswagen	Customer(s) filled with gasoline and drove until stall
Action 8-2	Summer 2010	N/A	High Pressure Fuel Pump PID 2374	Volkswagen	Management Report outlining HPFP failures and customer perception
Action 8-6	09/07/2010	09/07/2010	Mis-fueled TDI	Volkswagen	Customer(s) filled with gasoline and drove until stall
Action 8-7	02/04/2010	02/05/2010	Priority Customer Complaint Report	Volkswagen	Report outlining 31 vehicles with Fuel Injector replacements
Action 8-8	07/29/2010	08/05/2010	Analysis of failed injectors	Volkswagen	Report outlining that 30 out of 32 analyzed injectors were fully functional, 2 injector failed because of o-ring particles blocking the return line
Action 8-9	September 2010	September 2010	Open Issues Outside Top 5	Volkswagen	Report outlining vehicles with Fuel Injector replacements
Action 8-10	04/08/2010	04/08/2010	Priority Customer Complaint Report	Volkswagen	Report outlining 20 vehicles with Pressure Retention Valve replacements
Action 8-15	06/11/2010	06/11/2010	Presentation summarizing findings from analyzed injectors	Volkswagen	32 injectors from 10 vehicles have been analyzed, 1 was detected with sporadic failing injection, 1 with leaking, 2 sets with drained couplers
Action 8-17	11/04/2008	11/12/2008	VTA 383393_419420 CBEA stalled and does not restart	Volkswagen	Report of a vehicle stalling and not restarting and the fuel and part analysis associated
Action 8-18	02/19/2010	02/19/2010	Analysis Report - Rail Pressure Sensor "Overview"	Volkswagen	Report outlining vehicles with High Pressure Sensor replacements
Action 8-19	02/04/2010	02/04/2010	Analysis Report - Rail Pressure Sensor "Overview"	Volkswagen	Report outlining vehicles with High Pressure Sensor replacements
Action 8-20	Summer 2010	N/A	High Pressure Fuel Pump PID 2374	Volkswagen	Management Report outlining HPFP failures and customer perception
Action 8-21	Summer 2010	N/A	High Pressure Fuel Pump PID 2375	Volkswagen	Management Report outlining HPFP failures and customer perception
Action 8-23	10/08/2009	10/08/2009	email communication with attachment	Volkswagen	email provide a cut away model of the high pressure fuel pump and a problem sheet reporting individual failures of pumps
Action 8-24_VW_Submission	04/27/2010	04/27/2010	email containing a supplier's analysis report	Volkswagen / Supplier Bosch	Analysis of high pressure fuel pump failure: Corrosion / bad fuel was detected as cause for the failure
Action 8-25_VW_Submission	03/12/2010	03/12/2010	Analysis of failed part, Determination of cause	Volkswagen / Supplier Bosch	Analysis of failed high pressure fuel pump; pump was detected to be fully functional
Action 8-27_VW_Submission	07/01/2010	07/02/2010	email communication containing a table with failed and analyzed high pressure fuel pumps	Volkswagen	Findings from bad fuel to drive failure as cause for the pump failure, also tests pending where pumps appear to be functional
Action 8-28	08/22/2010	08/22/2010	Presentation reporting high pressure fuel pump failures and findings	Volkswagen	Findings from bad fuel to drive failure as cause for the pump failure, pumps that were determined to be functional
Action 8-35	09/17/2010	09/21/2010	VTA 646106_422577 Metal in the fuel system	Volkswagen	email communication discussing VIN 3VWRL71K29M072946 with metal in the fuel system
Action 8-36	09/21/2010	09/21/2010	VTA 646628_425072	Volkswagen	email communication discussing VIN 3VWRL71K89M085670 with metal in the fuel system
Action 8-37	06/11/2009	12/15/2009	P2146 2009 TDI	Volkswagen	Vehicle Stalled and fuel pumps were replaced
Action 8-38	07/16/2010	07/16/2010	RE: 620775 405073 2010 Jetta CR TDI P0087	Volkswagen	Vehicle lost power. Swapped lines on top of fuel tank
Action 8-39	07/16/2010	07/16/2010	620775 405073 2010 Jetta CR TDI P0087	Volkswagen	Vehicle lost power. Fuel sample results were pending
Action 8-40	07/16/2010	07/16/2010	2008 2.0 Jetta with a P0191	Volkswagen	Vehicle lost power, fuel pressure sensor replace, diagnosis pending. Technician advised to monitor pressure and replace regulator valve
Action 8-41	07/16/2010	07/16/2010	2008 2.0 Jetta with a P0191	Volkswagen	Vehicle lost power, fuel pressure sensor replace, diagnosis pending
Action 8-42	07/16/2010	07/16/2010	2009 2.0 Jetta with a P0191	Volkswagen	Vehicle lost power, fuel pressure sensor replace, diagnosis pending
Action 8-43	06/05/2010	06/05/2010	High Pressure Fuel Pump PID 2374	Volkswagen	Management Report outlining HPFP failures and customer perception
Action 8-44	06/11/2010	06/29/2010	JQU-16389 422A25 10 A3 2.0 TDI P2294 P0087	Volkswagen	Vehicle stalled while driving on the highway and exhibited fuel pressure faults
Action 8-45	06/07/2010	06/11/2010	TDI Mis-fuel	Volkswagen	Vehicle was mis-fueled and fuel system was replaced

Action Title	Actual or Planned Start Date	Actual or Expected End Date	Subject and Objective Summary	Engineering Group(s)/Supplier(s) Responsible	Summary of Findings and/or Conclusion
Action 8-46	06/03/2010	06/11/2010	TDI Mis-fuel	Volkswagen	Vehicle was mis-fueled and driven until it died. Diagnosis was ongoing
Action 8-47	05/12/2010	05/12/2010	Dennis Issue 595953 has been escalated to TFM for investigation	Volkswagen	Vehicle stalled and would not restart
Action 8-48	05/12/2010	05/12/2010	TFM Report 595953	Volkswagen	Vehicle stalled after refuel. Dealer suspected fuel contamination. Dealer was awaiting fuel analysis results
Action 8-49	06/09/2010	06/21/2010	RE:WAUKJAFM3AA160081@ 422A25 AC 606391	Volkswagen	Vehicle stalled while driving and metal shavings were found in the fuel filter. Diagnosis was ongoing
Action 8-50	08/02/2010	08/02/2010	JQU-15846 422A25 10 A3 2.0 TDI No Start	Volkswagen	Vehicle died and hard start issues
Action 8-51	06/10/2010	06/14/2010	TFM Report 606681	Volkswagen	Vehicle would stall and the high pressure pump was replaced
Action 8-52	04/05/2010	05/10/2010	RE: DR.01.25. Y+CO	Volkswagen	Vehicle lost power. Diagnosis was ongoing
Action 8-54	06/09/2010	06/22/2010	RE: WAUKJAFM3AA160081 @ 422A25 AC 606391	Volkswagen	Vehicle stalled while driving and metal shavings were found in the fuel filter. Fuel system components were replaced and a wiring issue was repaired
Action 8-55	06/09/2010	06/21/2010	RE: WAUKJAFM3AA160081 @ 422A25 AC 606391	Volkswagen	Vehicle stalled while driving and metal shavings were found in the fuel filter. Fuel system components were replaced and a wiring issue was repaired
Action 8-56	06/11/2010	06/11/2010	FW: Issue 606391 has been escalated to TFM for investigation	Volkswagen	Vehicle stalled while driving on freeway
Action 8-57	06/11/2010	06/11/2010	Jose Issue 606391 has been escalated to TFM for investigation	Volkswagen	Vehicle stalled while driving on freeway
Action 8-58	06/11/2010	06/11/2010	TFM Report 606391	Volkswagen	Vehicle stalled while driving on freeway. Dealer replaced fuel system components and repaired wiring issue
Action 8-60	09/01/2010	09/01/2010	FW: Executive Media Intelligence: Volkswagen Group of America 9.1.2010	Volkswagen	Contains articles regarding investigation as well as notes from Audi Employee
Action 8-61	05/17/2010	05/17/2010	MIL on, no start, rough running	Volkswagen	Inspection procedure
Action 8-62	06/20/2010	06/20/2010	MIL on, no start, rough running	Volkswagen	Inspection procedure
Action 8-63	09/01/2010	09/01/2010	email communication about this NHTSA inquiry and potential failures of the high pressure pump	Volkswagen	Mail contains information about failures caused by wrong fuel and pending status information
Action 8-65	05/12/2010	05/12/2010	Stalled, no start	Volkswagen	Advised to follow procedure to check fuel pump
Action 8-66	05/17/2010	05/17/2010	MIL on, no start, rough running	Volkswagen	Inspection procedure
Action 8-68	06/11/2010	06/11/2010	Stalled while driving	Volkswagen	Connector not seated properly
Action 8-69	06/09/2010	06/10/2010	WAUKJAFM3AA062035 @422A25 AC# 606681 Mileage 8472 2010 A3 2.0	Volkswagen	Fuel filter free of debris
Action 8-70	05/12/2010	05/12/2010	Stalled, no start	Volkswagen	Advised to follow procedure to check fuel pump
Action 8-71	N/A	N/A	MIL on, no start, rough running	Volkswagen	Inspection procedure
Action 8-72	04/26/2010	04/26/2010	Vehicle towed in, stall	Volkswagen	Metallic debris found in system
Action 8-73	06/09/2010	06/22/2010	WAUKJAFM3AA160081 @ 422A25 AC 606391	Volkswagen	Found loose connectors
Action 8-74	06/09/2010	06/14/2010	WAUKJAFM3AA160081 @ 422A25 AC 606391	Volkswagen	Check pressure retention valve
Action 8-75	04/09/2010	04/09/2010	Vehicle towed in, Crank no start	Volkswagen	Replaced fuel system
Action 8-76	06/11/2010	06/29/2010	A3 TDI Fuel pressure faults	Volkswagen	Stalled while driving
Action 8-77	06/10/2010	06/10/2010	A3 TDI fuel pump P0087	Volkswagen	Pressure low caused by low battery. Charge battery and tested fuel volume
Action 8-78	05/12/2010	05/19/2010	A3 TDI Crank, No Start	Volkswagen	Fuel pressure readings requested
Action 8-79	08/24/2010	10/05/2010	Fuel Analysis Tracking List	Volkswagen	Fuel analysis results of 49 vehicles

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9a) - Date of Modification (Incorporation into Vehicle Production)	9b) - Description of Modification	9c) - Reasons for Modification	Part Description / Name	9d) -Original Part Number	9e) - New Part Number	9f1) - Original Parts Withdrawn From Production? (Y/N - Date) (approx.)	9f2) - Original Parts Withdrawn From Service? (Y/N - Date)	9g) - Availability of New Part Number in Service? (Date)	9h) - Interchangeable with previous Production Part? (Y/N)
Planned: Jan 2010	Modifications to rods, valves, geometry, bearings, strainers	Robustness Improvement	Fuel Pump in Fuel Tank	1K0919050J	1K0919050AB	n/a	n/a	TBD	Y
5/26/2008	New shaft seal; Introduction of Anti Wear Package	leak-tightness at -29°C, Robustness of High Pressure Fuel Pump with bad US fuel quality	High Pressure Fuel Pump	03L130755	03L130755A	May 2008	N	May 2008	Y
9/1/2009	C-Coating removal, Introduction of Anti Wear Package	Increase of robustness with bad US fuel quality	High Pressure Fuel Pump	03L130755A	03L130755A	Sep 2010	Sep 2010	Sep 2010	Y
11/8/2010	Additional Robustness Measures	Increase of robustness with bad fuel quality in other markets	High Pressure Fuel Pump	03L130755A	03L130755A	Nov 2010	N	Nov 2010	Y

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No. of parts sold**	Part Description / Name	Service Replacement / Engineering Part Number	Model*	Model Year*	Usage Period	Cut-Off Date	Supplier
Fuel Tank							
6	Fuel Filler Cap	4F0201550G	Audi A3	2009-2011	SOP - June 2010	until exhausted	BLAU KUNSTSTOFFTECHNIK
79	Fuel Filler Cap Seal	3C0201557	Audi TT, A3, A4, A5, A6, R8, Q5, Q7	2005-2011	SOP to date	n/a, current part	BLAU KUNSTSTOFFTECHNIK
94	Fuel Filler Cap	1K0201550N	Golf, Jetta	2005-2011	SOP - June 2010	until exhausted	BLAU KUNSTSTOFFTECHNIK
122	Fuel Filler Cap Seal	1K0201557	Golf, Jetta, Passat, Tiguan, Touareg, Audi A3, A4, A5, A6, A8, R8, Q5, Q7	2008-2011	SOP to date	n/a, current part	BLAU KUNSTSTOFFTECHNIK
581	Fuel Tank	1K0201060GP	Golf, Jetta, Audi A3	2009-2011	SOP to date	n/a, current part	KAUTEX TEXTRON GMBH & CO. KG
93	Tank Ventilation Tube	1K0201993M	Golf, Jetta, Audi A3	2005-2011	SOP to date	n/a, current part	INDUSTRIA ILPEA ESPANA S.A.
1506	Fuel Pump in Fuel Tank	1K0919050J	Golf, Jetta, Audi A3	2005-2011	SOP to date	n/a, current part	CONTINENTAL AUTOMOTIVE
430	Fuel Gauge Sensor	1K0919673AF	Golf, Jetta, Eos, Audi A3, TT	2005-2011	SOP to date	n/a, current part	CONTINENTAL AUTOMOTIVE
104	Fuel Pump Fastener	1K0201375	New Beetle, Eos, Golf, Jetta, Passat, Tiguan, Touareg, Audi A3, TT, A8, Q5, Q7	2002-2011	SOP to date	n/a, current part	SCHUERHOLZ GMBH & CO.KG
190	Fuel Pump Washer	1K0919133C	Golf, Jetta, Audi A3	2005-2010	SOP to date	until exhausted	WOCO STV S.R.O.
484	Fuel Pump Washer	1K0919133D	Golf, Jetta, Audi A3	2005-2011	March 2007 to date	until exhausted	WOCO INDUSTRIE TECHNIK GMBH
2525	Fuel Pump Washer	8E0919133B	Golf, Jetta, Passat, Phaeton, Touareg, Audi A3, TT, A8, Q5, Q7	2001-2011	April 2007 to date	n/a, current part	VERITAS AG
Fuel Lines - Tank to Underbody at Tank (Feed & Return)							
198	Fuel Pipe Feed Line	1K0201293D	Golf, Jetta, Audi A3	2005-2011	SOP to date	n/a, current part	VERITAS DUNAKILITI KFT.
213	Fuel Pipe Return Line	1K0201294C	Golf, Jetta, Audi A3	2005-2011	SOP to date	n/a, current part	VERITAS DUNAKILITI KFT.
Fuel Lines - Underbody at Tank to Hand-over point in engine compartment (Feed & Return)							
4	Underbody Fuel Pipes	1K0200059AS	Jetta Wagon	2008	SOP to date	n/a, current part	TI GROUP AUTOMOTIVE SYSTEMS
221	Underbody Fuel Pipes	1K0200059BH	Golf, Jetta, Audi A3	2009-2011	SOP to date	n/a, current part	TI GROUP AUTOMOTIVE SYSTEMS
Fuel Lines - Hand-Over Point to Fuel Filter (Feed & Return)							
49	Fuel Pipes (Feed/Return)	1K0130295R	Golf, Jetta	2005-2010	SOP to date	until exhausted	VERITAS DUNAKILITI KFT.
191	Fuel Pipes (Feed/Return)	1K0130295AB	Golf, Jetta	2005-2011	Sep 2009 to date	until exhausted	VERITAS DUNAKILITI KFT.
30	Fuel Pipes (Feed/Return)	1K0130295AC	Jetta, Audi A3	2005-2010	Sep 2009 to date	until exhausted	VERITAS DUNAKILITI KFT.
Fuel Filter in Engine Compartment							
15	Fuel Filter with Flange	3C0127400C	Audi A3, Passat CC	2009-2011	SOP to date	n/a, current part	UFI FILTERS SPA.
898	Fuel Filter Element for 3C0127434	3C0127434	Audi A3, TT, Passat CC	2009-2011	SOP to date	n/a, current part	UFI FILTERS SPA.
634	Fuel Filter with Flange	1K0127400F	Golf, Jetta	2005-2011	SOP to date	n/a, current part	MANN + HUMMEL GMBH
151	Fuel Filter with Flange	1K0127400K	Golf, Jetta	2005-2011	SOP to date	n/a, current part	MANN + HUMMEL GMBH
33201	Fuel Filter Element for 1K0 127 400 F	1K0127434	Golf, Jetta	2005-2011	SOP to date	n/a, current part	MANN + HUMMEL GMBH
37413	Fuel Filter Element for 1K0 127 400 F, PD&CBEA Engine	1K0127434A	Golf, Jetta	2005-2011	SOP to date	n/a, current part	MANN + HUMMEL GMBH
25010	Fuel Filter Element for 1K0 127 400 K	1K0127434B	Golf, Jetta	2005-2011	SOP to date	n/a, current part	MANN + HUMMEL GMBH
Fuel Line - Fuel Filter to Inline-Pump (Feed)							
67	Fuel Pipe	1K0130307AL	Golf, Jetta	2005-2010	SOP to date	until exhausted	VERITAS DUNAKILITI KFT.
147	Fuel Pipe	1K0130307BG	Golf, Jetta	2005-2011	Sep 2009 to date	n/a, current part	VERITAS DUNAKILITI KFT.
21	Fuel Pipe	1K0130307BK	Audi A3	2009-2011	Sep 2009 to date	n/a, current part	VERITAS DUNAKILITI KFT.
834	In-Line Fuel Pump	5N0906129B	Golf, Jetta, Audi A3	2009-2001	May 2008 to date	n/a, current part	Bosch ***
Fuel Line - Inline-Pump to High-Pressure Pump (Feed)							
65	Fuel Pipe (Feed)	5N0130307G	Golf, Jetta, Audi A3	2009-2010	SOP to date	until exhausted	VERITAS DUNAKILITI KFT.
85	Fuel Pipe (Feed)	5N0130307H	Golf, Jetta, Audi A3	2009-2011	June 2006 to date	until exhausted	VERITAS DUNAKILITI KFT.
515	Fuel Pipe (Feed)	5N0130307J	Golf, Jetta, Audi A3	2009-2011	Sept 2009 to date	n/a, current part	VERITAS DUNAKILITI KFT.
153	Fuel Temperatur Sensor	03L919824C	Golf, Jetta, Audi A3	2009-2011	SOP to date	n/a, current part	HENZEL FORMENBAU GMBH
High Pressure Fuel Pump (HPFP)							
73	High Pressure Fuel Pump	03L130755	Golf, Jetta, Audi A3	2008-2011	SOP to May 2008	until exhausted	ROBERT BOSCH GMBH AUTOMOTIVE
783	High Pressure Fuel Pump	03L130755A	Golf, Jetta, Audi A3	2008-2011	May 2008 to Sept 2009	Sept 2009	ROBERT BOSCH GMBH AUTOMOTIVE
		03L130755A	Golf, Jetta, Audi A3	2008-2011	Sept 2009 to date	n/a, current part	ROBERT BOSCH GMBH AUTOMOTIVE
High Pressure Fuel Line from HPFP to Distribution Rail							
722	HPFP to Rail Feed Line	03L130321	Golf, Jetta, Audi A3	2009-2011	SOP to date	n/a, current part	VERITAS AG
734	Rail	03L130089	Golf, Jetta, Audi A3	2009-2011	SOP to date	n/a, current part	REGA MOTORENTEILE GMBH
223	Rail Pressure Sensor	03L906051	Golf, Jetta, Audi A3	2009-2011	SOP to date	n/a, current part	SENSATA TECHNOLOGIES
93	Rail Pressure Regulation Valve	057130764H	Golf, Jetta, Audi A3	2009-2011	SOP to date	n/a, current part	ROBERT BOSCH GMBH
88	Pressure Regulation Valve Seal	N 90451902	Golf, Jetta, Passat CC, Tiguan, Touareg (also used in Gasoline engines)	2005-2011	SOP to date	n/a, current part	DICHTUNGSTECHNIK WALLSTABE &
Injector Feed lines from rail to Injector							
740	Injector (1) HP Feed Line	03L130301	Golf, Jetta, Audi A3	2009-2011	SOP to date	n/a, current part	VERITAS AG
816	Injector (2) HP Feed Line	03L130301R	Golf, Jetta, Audi A3	2009-2011	SOP to date	n/a, current part	VERITAS AG
746	Injector (3) HP Feed Line	03L130301B	Golf, Jetta, Audi A3	2009-2011	SOP to date	n/a, current part	VERITAS AG
720	Injector (4) HP Feed Line	03L130301C	Golf, Jetta, Audi A3	2009-2011	SOP to date	n/a, current part	VERITAS AG
5	Fuel Injector	03L130277	Golf, Jetta, Audi A3	2009-2011	SOP to May 2008	May 2008	ROBERT BOSCH GMBH
3168	Fuel Injector	03L130277A	Golf, Jetta, Audi A3	2009-2011	May 2008 to date	n/a, current part	ROBERT BOSCH GMBH

1751	Injector Seal	059130119	Golf, Jetta, Audi A3	2009-2011	SOP to date	n/a, current part	ROBERT BOSCH GMBH
1522	Injector Retention Plate	059130216C	Golf, Jetta, Audi A3	2009-2011	SOP to date	n/a, current part	MANFRED ALBRECHT GMBH
1776	Injector Seal	059130519	Golf, Jetta, Audi A3	2009-2011	SOP to date	n/a, current part	ROBERT BOSCH GMBH
3251	Injector Seal	WHT000884	Golf, Jetta, Audi A3	2009-2011	SOP to date	n/a, current part	FREUDENBERG DICHTUNGS- UND
Injector Fuel Return Line with Retention Valve							
26	Injector Return w/ Retention Valve	03L130235F	Golf, Jetta, Audi A3	2009-2011	SOP to June 2008	until exhausted	ROBERT BOSCH GMBH
741	Injector Return w/ Retention Valve	03L130235K	Golf, Jetta, Audi A3	2009-2011	June 2008 to June 2009	until exhausted	ROBERT BOSCH GMBH
203	Injector Return w/ Retention Valve	03L130235S	Golf, Jetta, Audi A3	2009-2011	June 2009 to date	n/a, current part	ROBERT BOSCH GMBH
Retention Valve to Fuel Filter (Return)							
359	Fuel Pipe	03L201360G	Golf, Jetta, Audi A3	2009-2011	Oct 2008 to date	n/a, current part	VERITAS AG
81	Fuel Pipe	1K0130307AN	Golf, Jetta	2009-2011	SOP to Sept 2009	until exhausted	VERITAS DUNAKILITI KFT.
148	Fuel Pipe	1K0130307BJ	Golf, Jetta	2009-2011	Sept 2009 to date	n/a, current part	VERITAS DUNAKILITI KFT.
4	Fuel Pipe	1K0130307BH	Audi A3	2009-2011	Sept 2009 to date	n/a, current part	VERITAS DUNAKILITI KFT.
Fuel Line Filter to Tank - see above (parallel to Feed / parts contain feed and return line)							
* Model and Model Year Columns denote the ranges, not all models individual models may have used the respective part for the full period							
** Part Sales include maintenance parts (e.g. filter elements), also models outside the scope of the inquiry may utilize the same parts							
*** Assembly of pump and bracket is sourced from Veritas AG, the pump actually is provided by Bosch GmbH, thus Bosch is listed as supplier.							
Table contains cumulative part sales data from January 2008 through end of September 2010							

List of Suppliers and Contacts

ROBERT BOSCH GMBH	ROBERT BOSCH GMBH MI / Farmington Hills 38000 Hills Tech Drive Contact: Jerry Johnson Assistant General Counsel Phone: +1(248)876-7381
CONTINENTAL AUTOMOTIVE	CONTINENTAL AUTOMOTIVE Guerickestrasse 7 60441 Frankfurt a. M. Contact: Karlheinz Haupt Corporate Quality and Environment Phone: +49 69 7603-4030
MANN + HUMMEL GMBH	MANN + HUMMEL GMBH KOLLBACHER STR. 31 84163 MARKLKOFEN Contact: Dr. Martin Haller Quality Plant Marklkofen Phone: +49 8732 20 5896
SENSATA TECHNOLOGIES	SENSATA TECHNOLOGIES 7602 EM ALMELO KOLTHOFSINGEL 8 Contact: Toon Andringa Lead Design Engineer Phone: +31 546 879 315

Volkswagen provides address and point of contact for those suppliers whose parts were identified to be related to the alleged defect. The other suppliers' parts were found to be consequential damage parts, thus the point of contact was not requested from the supplier. If NHTSA would like to contact those suppliers, Volkswagen will retrieve the contact information upon request.