

VOLKSWAGEN

GROUP OF AMERICA

Kathleen Demeter
Director, Office of Defects Investigations
U.S. Department of Transportation
National Highway Traffic Safety Administration
1200 New Jersey Ave, S.E.
Washington, DC 20590

CHRISTOPHER T. SANDVIG NAME
GM - COMPLIANCE / TREAD TITLE
PRODUCT COMPLIANCE DEPARTMENT
248-754-5000 PHONE
248-754-5093 FAX
July 14, 2008 DATE

Subject: **PE08-027 NVS-213.swmc; Fuel Pump Assembly Failure
Resulting in Engine Stall**

7/14/08

Dear Ms. Demeter:

VOLKSWAGEN GROUP OF AMERICA, INC
3800 HAMLIN ROAD
AUBURN HILLS, MI 48326
PHONE +1 248 754 5000

Thank you for your consideration in granting our requested extension to July 14, 2008.

Please find attached the remainder of Volkswagen's response to Requests 7-14 of PE08-027 regarding fuel pump assemblies on certain Audi A4 vehicles.

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

Regards,



Christopher T. Sandvig
GM - Compliance / TREAD
Volkswagen Group of America

Attachments

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 Volkswagen 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 Volkswagen is planning to issue within the next 120 days.

Response 7

In response to this inquiry, Volkswagen has identified four Safety Recall Circulars related to the alleged defect in the MY 2003 Audi A4 peer vehicles, and is providing copies in Adobe Acrobat format attached hereto as Exhibit to Request 7.

Additionally, Volkswagen is not aware of any communication being planned within the next 120 days related to the alleged defect in the subject and peer vehicles.

Source: VWGoA Product Support, ElsaWeb

Date Gathered: Through the date of the inquiry.

Exhibit to Request 7

REQUEST NUMBER SEVEN DATA

Data is provided in REQUEST NUMBER SEVEN folder on the PE08-027 Data Collection Disk

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 vehicles that have been conducted, are being conducted, are planned, or are being planned by, or for, Volkswagen. 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

The documents have been sorted chronologically according to the end date.

Identifier 1

- a. **Attachment 8_Identifier 1**
- b. **Unknown**
- c. **April 22, 2005**
- d. **Clarification of corrective actions for fuel pump**
- e. **Volkswagen Group of America**
- f. **Email communication requesting clarification of fuel pump corrective action**

Identifier 2

- a. **Attachment 8_Identifier 2**
- b. **Unknown**
- c. **July 19, 2007**
- d. **Chart of Warranty Claims for Fuel Pump**
- e. **Volkswagen Group of America**
- f. **Chart shows claims for recall decision making and claims outside the recall with small incident rate**

Identifier 3

- a. **Attachment 8_Identifier 3 [German Original and English Translation]**
- b. **Unknown**
- c. **February 15, 2008**
- d. **Top 10 items**
- e. **VWAG and Volkswagen Group of America**
- f. **Top 10 item summary**

Identifier 4

- a. **Attachment 8_Identifier 4**
- b. **Unknown**
- c. **May 02, 2008**
- d. **Exchanged fuel pumps requested to be returned from dealers**
- e. **Volkswagen Group of America**
- f. **Email communication requesting the return of exchanged fuel pumps on 2002-2005 Audi A4 vehicles from dealers**

Identifier 5

- a. **Attachment 8_Identifier 5 [German original and English translation]**
- b. **Ongoing activity as part of normal business responsibilities**
- c. **Ongoing activity as part of normal business responsibilities**
- d. **Volkswagen received some fuel pumps and analyzed as part of routine market observation**
- e. **The pumps were analyzed by Audi Quality Assurance and the supplier**
- f. **Please refer to Attachment 8_Identifier 5 [German original and English translation]**

Source: VWGoA & VWAG

Date Gathered: Through the date of the inquiry

Exhibit to Request 8

REQUEST NUMBER EIGHT DATA

**Data is provided in Adobe Acrobat format in the REQUEST NUMBER EIGHT DATA folder on the
PE08-027 Data Collection Disk**

Request 9

Describe all modifications or changes made by, or on behalf of, Volkswagen 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 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 Volkswagen 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 an Adobe Acrobat file entitled "REQUEST NUMBER NINE DATA.pdf" attached hereto as Exhibit to Request 9.

Exhibit to Request 9

REQUEST NUMBER NINE DATA

Data is provided in Adobe Acrobat format on the PE08-027 Data Collection Disk

Request 10

Produce one of each of the following:

- a. Exemplar samples of each design version of the subject component; and
- b. Field return samples of the subject component exhibiting the subject failure mode.

Response 10

- a. Volkswagen is providing exemplar parts of design versions of the subject components.
- b. Volkswagen will be providing a field return sample of the subject component exhibiting the subject failure mode separately due to hazardous material shipping policies.

Request 11

State the number of subject components that Volkswagen has sold that may be used in the subject 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).

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 Volkswagen 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 11

In response to this inquiry, Volkswagen is providing an Adobe Acrobat file entitled "PART SALES DATA.pdf" attached hereto as Exhibit to Request 11.

Volkswagen is providing the number of subject component sales from VWGoA to authorized Audi dealers. Volkswagen notes that it is not possible to determine if the sale of any of these individual parts relates in any way to the alleged defect in the subject vehicles, or if the sale of these parts actually represents installation on any of the subject vehicles. Volkswagen notes the part sales include the number of subject components sold for use on the MY 2004 Audi A4 subject vehicles as well as the MY 2003 and MY 2005 Audi A4 peer vehicles. Volkswagen notes the majority of and increase in parts sales is due to the Safety Recall JL.

Supplier name and address information for subject fuel pump assembly:

Supplier of subject component(s):

Supplier's name: Continental Automotive GmbH
Address: Arminiusstrasse 59
44149 Dortmund
Name: Joachim Hoffmann
Title: Head of Quality Department
Telephone number: +49 / (0)231/1761-595

Other vehicles which contain the identical component:

Comparable fuel pumps for 8E0906087P and 8E0906087N are used in the Audi A6 (MY 1998-2005) and the Volkswagen Passat MY 2001-2005. Service usage is from September 2001 to present.

Exhibit to Request 11

PART SALES DATA

Data is provided in Adobe Acrobat format on the PE08-027 Data Collection Disk

Request 12

Provide the following information regarding the effects of engine stall on braking performance in the subject vehicles:

- a. Describe the operation of the brake power assist system in the subject vehicles and state the effects of engine stall on system operation;
- b. Describe how VW measures brake system performance in the following conditions: (1) following engine stall; and (2) with complete loss of brake power assist;
- c. Provide copies of all documents related to VW engineering standards, specifications or design guidelines, that relate to 12.b;
- d. Provide copies of all test reports related to 12.b for the subject vehicles;
- e. Describe and provide copies of all documents relating to, studies, tests, analyses, technical papers or other reference material showing the maximum braking pedal force capabilities of male and female drivers (show for the low end, 5th percentile and 50th percentile for each demographic group);
- f. Provide graphs showing (1) brake line pressure (at the left front wheel), (2) vehicle deceleration (describe the road surface used and its coefficient of friction), and (3) brake pedal travel as functions of brake pedal force for normal system operation and for the first application after the engine has stalled and for each successive application until the source of power assist is fully depleted; and
- g. A table showing the brake pedal force and travel required to achieve decelerations of 0.1 to 0.9 g's, in increments of 0.1g, for normal system operation and for operation with no brake power assist, and describe the road surface used and its coefficient of friction.

Response 12

In the subject Audi A4 MY 2004 vehicles, the brake power assist unit (brake booster) is powered by the intake tube vacuum. Vehicles produced with automatic transmissions are additionally equipped with an electrical vacuum pump, therefore in the unlikely event of an engine stall, the brake power assist is still available.

Volkswagen measures brake system performance according to all prescribed test procedures in FMVSS 571.135. The FMVSS 571.135 outlines applicable test procedures and conditions according to which Volkswagen organizes and tests brake system performance on US specification vehicles only. This document is attached hereto as Attachment 12a.pdf. According to these guidelines, "Vehicles shall be capable of stopping under partial failure of the service brake system, inoperative brake power assist unit or brake power unit, antilock failure, variable proportioning valve failure, and with the engine off." (4)

The brake power assist has been tested to meet or exceed the standards identified in FMVSS 571.135, which specifically state that "The service brakes on a vehicle equipped with one or more brake power assist units or brake power units, with one such unit inoperative and depleted of all reserve capability, shall stop the vehicle as specified in A (S7.11.4(a)) or B (S7.11.4(b)) below. A. Stopping Distance from 100 km/h Test Speed: ≤ 168 m (551 ft) B. Stopping Distance for Reduced Test Speed: $S \leq 0.10V + 0.0158V^2$."(45) The vehicles are tested with a GVWR load, although distinguishing between male and female drivers is not prescribed by the FMVSS guidelines.

Volkswagen has attached the relevant test report related to 12.b, which shows brake performance testing results on a vehicle substantially similar to the subject vehicle. Test results measuring brake performance requirements, which were fulfilled in accordance with the provisions in FMVSS 571.135 are attached hereto as Attachment 12b [German original and English translation].pdf. These results also include a graph showing the pedal force as function of the brake line pressure for a) system with brake assist and b) no brake assist.

Exhibit to Request 12

REQUEST NUMBER TWELVE DATA

Data is provided in Adobe Acrobat format in the REQUEST NUMBER TWELVE DATA folder on the PE08-027 Data Collection Disk

Request 13

Provide the following information regarding the effects of engine stall on steering performance in the subject vehicles:

- a. Describe the operation of the steering power assist system in the subject vehicles and state the effects of engine stall on system operation;
- b. Describe how VW measures steering system performance in the following conditions: (1) following engine stall; and (2) with complete loss of steering power assist;
- c. Provide copies of all documents related to VW engineering standards, specifications or design guidelines, that relate to 13.b;
- d. Provide copies of all test reports related to 13.b for the subject vehicles;
- e. Describe and provide copies of all documents relating to, all studies, tests, analyses technical papers or other reference material showing the maximum steering effort capabilities of male and female drivers (show for the low end, 5th percentile and 50th percentile for each demographic group);
- f. State by model, model year, and any other distinguishing factor the diameter of the steering wheel;
- g. Describe and provide test data showing the effects of engine stall on steering wheel force as a function of lateral acceleration for normal system operation and after loss of assist; and
- h. Describe, and provide copies of all related documents, all testing or analyses conducted by VW to assess assisted and unassisted steering efforts with and without assist in low speed (less than 10 mph) and stationary turning maneuvers, such as turns at high steering angular inputs (e.g., full lock turns from a stop).

Response 13.

- a. **In the MY 2004 Audi A4 subject vehicles, the steering power assist system is powered by an engine driven ribbed belt.**

In the rare event that the engine ceases to receive fuel, the engine continues to rotate with the existent inertia energy at speeds above 19 mph in vehicles equipped with automatic transmissions. The gears within these vehicles decrease as the vehicle speed decreases. When the vehicles speed reaches 19 mph, the clutch opens. In vehicles equipped with manual transmissions, the clutch opens when the customer pushes the clutch pedal. If the clutch is open, the steering power assist becomes inoperative, but the vehicle can still be steered with increased force thereby allowing the operator to maneuver the vehicle safely to the shoulder.

- b. **Volkswagen measures steering power assist system performance according to all prescribed test procedures in the European Standard called 70/311/EEC. Please refer to the Attachment 13c.pdf.**

The test procedures are described in Part 5 of 70/311/EEC and are defined in Sections 5.2.5.1 through 5.2.6.2.

Volkswagen notes the that the use of the term "Intact" is defined as with steering power assist and "with a failure" is defined as without steering power assist.

"The vehicle shall be driven from straight ahead into a spiral at a speed of 10 km/h. The steering effort shall be measured at the nominal radius of the steering control until the position of the steering control corresponds to turning radius given in the table below for the particular category of vehicle with intact steering. One steering movement shall be made to the right and one to the left."

The steering effort shall be measured until the position of the steering control corresponds to the turning radius given in the table below for vehicles with and without steering power assist.

Steering Control Effort Requirements

Vehicle category	Intact			With a failure		
	Maximum effort (daN)	Time(s)	Turning radius (m)	Maximum effort (daN)	Time(s)	Turning radius (m)
M1	15	4	12	30	4	20

Detail of Table related to the subject vehicle out of part 5.2.6.2.

- c. See the Attachment 13c.pdf.
- d. Volkswagen has attached the test report related to 13.b with a substantially similar vehicle. See Attachment 13d.pdf, Steering Test Results.
- e. Volkswagen has not performed any tests under this condition.
- f. Volkswagen offered the following two steering wheels on Audi A4 model year 2004 vehicles:
 - 3 spoke steering wheel with a diameter of 375 mm
 - 4 spoke steering wheel with a diameter of 380 mm
- g. Volkswagen has not performed any tests under this condition.
- h. See Attachment 13d.pdf, Steering Test Results.

Exhibit to Request 13

REQUEST NUMBER THIRTEEN DATA

Data is provided in Adobe Acrobat format in the REQUEST NUMBER THIRTEEN DATA folder on the PE08-027 Data Collection Disk

Request 14

Furnish Volkswagen'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 failure rates associated with each failure mechanism identified in 14.b at the following service intervals: 12, 36 and 60 months in service - use actual data where available and provide VW's statistical model of the data (e.g., Weibull analysis with slope, characteristic life and correlation coefficient parameters stated);
- e. The percentage of subject component failures attributed to each failure mechanism identified in 14.b that result in stall while driving;
- f. The risk of stall while driving at highway speeds (50 miles per hour or greater);
- g. The ability of the operator to restart a subject vehicle that has stalled due to the alleged defect;
- h. The risk to motor vehicle safety that it poses;
- i. 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
- j. The reports included with this inquiry.

Response 14

- a. **Volkswagen believes that the possible causal or contributory factors of the alleged defect in the subject vehicles could result from excessive accumulation of foreign materials in the fuel filter. In rare cases, the fuel filter could become clogged, which can cause increased pressure on the pump.**
- b. **Volkswagen believes that the overloaded fuel pump could reduce the rate at which fuel is delivered to the engine.**
- c. **An overloaded fuel pump could result in the reduction of engine power, noise, hesitation, or in rare cases an engine stall may occur.**
- d. **Volkswagen notes that the failure rates for MY 2004 Audi A4 responsive subject vehicles are much lower than the rates for MY 2003 Audi A4 peer vehicles, which were subject to the JL Safety Recall. Volkswagen has attached a chart that illustrates the failure rates up to 12, 36, and 60 months in service for both subject and peer vehicles. Please refer to the Attachment "FAILURE RATE MONTHS IN SERVICE.pdf."**
- e. **This information is provided in response to 14d. Please refer to the Attachment "FAILURE RATE MONTHS IN SERVICE.pdf."**
- f. **Volkswagen believes that the very low incident rate and the absence of any reported crashes, injuries, or fatalities in the subject vehicles resulting from engine stall while at highway speeds indicate the absence of an unreasonable risk to motor vehicle safety. Volkswagen also notes that the driver has adequate braking and steering capabilities to maintain control of the vehicle even after the engine stalls.**
- g. **The operator is unable to restart a subject vehicle that has stalled due to the alleged defect.**

- h. Volkswagen has researched the similarities between this inquiry and ODI case PE02-066. In that case, ODI opened – and subsequently closed – an investigation of more than 1.6 million General Motors vehicles for alleged fuel pump failures resulting in engine stalling. The alleged defect and failure mode in the subject vehicles of this inquiry are substantially similar to the alleged defect and failure mode in the subject vehicles of PE02-066. Thus, both investigations involve the same attribute “a” (alleged defect and failure mode = fuel pump and engine stalling).

In response to PE02-066, General Motors provided warranty claims; consumer complaints; and other field information. On the basis of these data, as well as VOQs and injury incidents, a cumulative failure rate emerged of 0.52% (R/1000 = 5.24). Of this information, ODI focused on the warranty rate at 36 months in service. Using this metric, ODI found that “none of the relevant warranty repair rates exceed 1% at 36 months of exposure.” Volkswagen notes that in the subject vehicles of this inquiry, the warranty repair rate of the model year 2004 Audi subject vehicles is also less than 1% at 36 months of exposure. Thus, both investigations involve the same attribute “b” (failure rate = less than 1% at 36 months in service).

Also in response to PE02-066, General Motors identified the number of stalling-related incidents that resulted either in injuries or fatalities. In its closing resume, ODI reported a total of seven crashes, noting that one crash involved a rear-end collision, “while the remainder involved minor collisions or scrapes.” Moreover, “the sole injury consisted of bruising from a low speed” front-end crash. No fatalities were reported. As in the General Motors case, Volkswagen has provided data in this response to your inquiry showing that there were no incidents of crashes, injuries, or fatalities reported in the subject vehicles resulting from the alleged defect or failure mode. Thus, both investigations involve the same attribute “c” (incident rate = low or non-existent).

Based on: (1) the low failure rate as measured by warranty claims, as well as (2) the low number of incidents (seven crashes), ODI closed PE02-066. For purposes of this analogical analysis, this closing attribute will be labeled “d.”

In sum, the General Motors case and the MY 2004 Audi A4 subject vehicles of this inquiry may be represented as having the following analogical form:

General Motors and Volkswagen both share key attributes “a” (alleged fuel pump failure resulting in engine stalling); “b” (low failure rate); and “c” (low number of or no incidents). General Motors was granted the attribute “d” (closing of case). Therefore, Volkswagen believes that ODI should grant a similar conclusion or attribute “d” (closing of case) in this inquiry.

Volkswagen does not believe there is an unreasonable risk to motor vehicle safety.

- i. Volkswagen notes that before the subject vehicles experience the alleged failure mode of engine stall, the operator could possibly experience a number of warnings such as noise, inconsistent acceleration, or a different vehicle velocity behavior than usual.
- j. Volkswagen has no inquiries or reports.

Exhibit to Request 14

FAILURE RATE MONTHS IN SERVICE

Data is provided in Adobe Acrobat format on the PE08-027 Data Collection Disk