



U.S. Department  
of Transportation  
**National Highway  
Traffic Safety  
Administration**

## ODI RESUME

Investigation: EA 03-020  
Prompted By: PE03-021  
Date Opened: 10/07/2003 Date Closed: 04/23/2004  
Principal Investigator: Mark Swanson  
Subject: Passenger air bag lid failure

Manufacturer: Volkswagen of America, Inc.  
Products: 1998-2002 Volkswagen Passat  
Population: 330,661

Problem Description: The passenger supplemental inflatable restraint lid may detach from the instrument panel during air bag deployment.

### FAILURE REPORT SUMMARY

	ODI	Manufacturer	Total
Complaints:	0	0	0
Crashes/Fires:	0	0	0
Injury Incidents:	0	0	0
# Injuries:	0	0	0
Fatality Incidents:	0	0	0
# Fatalities:	0	0	0
Other*:	2	0	2

\*Description of Other: ODI identified one incident vehicle in an insurance lot. A second vehicle was reported by SCI.

Action: The Engineering Analysis is closed.

Engineer: Mark B. Swanson *MS*

Date: 04/23/2004

Div. Chief: Thomas Z. Cooper

Date: 04/23/2004

Office Dir.: Kathleen C. DeMeter

Date: 04/23/2004

Summary: This investigation involves the Volkswagen (VW) passenger supplemental inflatable restraint (PSIR) lid utilized in my 1998-2002 VW Passat. The PSIR lid may detach from the instrument panel during air bag deployment. The Office of Defects Investigation (ODI) of the National Highway Traffic Safety Administration (NHTSA) opened the Preliminary Evaluation on May 23, 2003 to determine whether alleged PSIR lid detachment presents an unreasonable safety risk to passengers in the vehicle. ODI's investigation reveals that detachment of the PSIR lid during air bag deployment may occur for two reasons: 1) the shape of the PSIR lid, and the length of the attaching tether, may snag the air bag during deployment applying additional pressure on bolts that fasten the lid to the instrument panel (IP); and/or 2) the original PSIR lid design (subject vehicles) utilized six grade 4.8 mm carbon steel tack weld bolts which may not be as strong as the new design PSIR lid consisting of six grade 8.8 mm carbon steel press bolts that are heat treated.

ODI concludes that detachment of the PSIR lid is a defect because the lid should remain attached to the IP after deployment of the airbag. However, after analyzing VW's responses, and test data collected by VW and Faurecia, the PSIR lid supplier, ODI believes that further investigation would not likely identify a safety-related defect trend because a detached PSIR lid and parts do not project towards a passenger during deployment of the airbag. The test data shows that the airbag pushes a detached PSIR lid upwards into the windshield during deployment, and away from the passenger compartment. It is highly unlikely that a passenger would contact the PSIR lid or associated parts during air bag deployment. Therefore this Engineering Analysis (EA03-020) is closed. The closing of this investigation does not constitute a finding by NHTSA that a safety-related defect does not exist.

For a detailed discussion of the PSIR lid and testing, see the attached report.

*MS*  
*4/23/04*

**THE ALLEGED DEFECT:** The Passenger Side Inflatable Restraint (PSIR) lid may detach from the Instrument Panel (IP) during deployment of the air bag.

**DESCRIPTION OF PSIR AND LID ASSEMBLY:** The VW Passat PSIR is designed to deploy during a moderate to severe frontal collision to protect a passenger from injury. The PSIR is located in the IP on the passenger side beneath a metal lid (PSIR lid), and is covered with the same material used for the IP. The PSIR lid is hinged along the forward edge (nearest the windshield) to the IP by two tether straps that are connected to two tether bars. One tether bar is fastened with nuts to three bolts. The three bolts are welded to a backing plate imbedded into the IP. The other tether bar is fastened with nuts to three bolts. The three bolts are also welded to a backing plate in the lid. During inflation of the air bag, the PSIR lid will separate, but remain tethered to the IP. The PSIR lid will rotate up and towards the windshield allowing the air bag to deploy.

**WARRANTY:** VW reports no warranty claims relating to the alleged defect at this time.

**SERVICE BULLETINS:** None.

**DESIGN, MATERIAL, AND/OR PRODUCTION MODIFICATIONS:** On or about March 1, 2002, Faurecia, VW's supplier of the instrument panel, altered the design of the fastening bolts that attach the PSIR lid to the IP. Prior to March 1, 2002, the PSIR lid was fastened to the IP with six 4.8 carbon steel tack weld bolts that have a tensile strength of 320N/mm<sup>2</sup>. On or about March 1, 2002, the PSIR lid was fastened to the IP with six 8.8 carbon steel press bolts, that are heat-treated, and have a tensile strength of 640N/mm<sup>2</sup>. In addition, Faurecia changed the tolerance specs for length of the tether straps by deleting the minus tolerance and increasing the plus tolerance. By lengthening the tether straps, ODI opines that this would reduce the chances that the PSIR lid would snag onto the airbag during deployment.

VW explains that the March 1, 2002 bolt changes is for the purpose of expediting the production of VW Passat by eliminating the time needed to weld the six 4.8 carbon steel tack weld bolts to the IP. The bolts are now pressed into the IP and heat-treated.

**TESTING:** VW, Faurecia, and the Vehicle Research Test Center (VRTC) of NHTSA conducted testing of the PSIR system.

VW provided video recordings showing airbag deployment, "static deployment,"<sup>1</sup> and frontal collision tests involving the subject vehicles. VW also provided test results from Faurecia's product surveillance testing during production of the PSIR assembly. VW reports it conducted 19 frontal collision tests on subject vehicles for their production development program. VW states that the PSIR lid did not detach during any of those 19 frontal collision tests.

VW also conducted 4 static deployment tests, in response to this investigation, to determine if a vehicle occupant is at risk of injury when the PSIR lid detaches during air bag deployment. For the 4 static deployment tests, VW weakened the fastening bolts of the PSIR lid to ensure that the PSIR lid would detach from the IP during air bag deployment. Three of the tests were conducted with the 4.8 tack weld bolts, and the fourth test was conducted with the 8.8 press bolt. All bolts were substantially sawed through and weakened to the point of shear. Two of the 4.8 tack weld bolts and the 8.8 press weld bolts were also over-torqued to increase the tensile load. The 4.8 tack weld bolts without the over-torque condition did not fail during the test. The other three tests produced PSIR lid and bolt separations.

For the three test failures, video recordings show some small fragments entering the passenger compartment. Importantly, the small fragments enter the passenger compartment either next to, or above the passenger air bag at the time a passenger would come into contact with the airbag. The detached PSIR lid rotates upward and is pushed against the windshield. Although the PSIR detaches from the IP, it would not contact a passenger and it remains in the area between the inflated air bag and windshield.

Faurecia, VW's supplier of the IP, states it conducted 1,500 static deployment tests of the PSIR system as part of a product surveillance program. Out of the 1,500 static deployment tests, the PSIR lid detached during 17 tests. One of the failures occurred at room temperature, and the others failures occurred during extreme weather testing with temperatures ranging from -25°C to +85°C (See chart below for test data).

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<sup>1</sup> Static Deployment means a PSIR deployment, in a test setting, and usually not in a vehicle.

ODI also sent samples of the sheared bolts found in the two field vehicles to the VRTC in Ohio to determine if a metallurgical defect exists. VRTC analyzed these bolts (all sheared bolts found in the field vehicles were weld bolts) and could not conclude that the bolts contained a metallurgical defect.

**CONTRIBUTING FACTORS AND WARNING SYMPTOMS:** None.

**ANALYSIS:** ODI initiated this investigation after receiving reports that in two vehicles, the PSIR lid was detached, and some PSIR parts were located in the passenger compartment. One vehicle was located in a salvage yard by ODI investigators during a field inspection trip related on other matters. The vehicle's detached PSIR lid was discovered on the front passenger seat and some bolts were also resting on the front passenger seat. The other vehicle was reported to ODI by the Office of Special Crash Investigations (SCI). That vehicle is a case study vehicle from the Crashworthiness Data System (CDS). (The CDS studies passenger vehicle crashes to investigate injury mechanisms to identify potential improvements in vehicle design.) The case study vehicle is a MY 2000 VW Passat that had a PSIR deployment due to a frontal collision. The PSIR lid was located on the passenger front seat and bolts were located on the floor of the rear seats. These two vehicles remain as the only identified vehicles that allegedly had a PSIR lid failure. Neither NHTSA nor VW have received any complaints or are aware of injury or death related to the alleged defect.

ODI reviewed and analyzed the data submitted by VW and Faurecia in response to ODI's information requests. In addition to VW's submission, ODI monitored the complaint and warranty rates, and field experience of the 1998-2002 VW Passat. While injuries are not a critical element of a safety relatedness finding, no injuries have been identified or reported that relate to, or may relate to, the defect in this investigation. Further, no additional failures, warranty reports, field reports, or complaints have been reported since the inception of this investigation.

In addition, ODI also reviewed the following data sources:

- NASS: A review of the NASS files identified twenty cases involving the subject vehicle. Eight of the cases had PSIR deployments the other 12 did not. No detachments of the PSIR lids occurred on any of the subject vehicles.
- New Car Assessment Program (NCAP): NCAP performed two front barrier crash tests with the subject vehicles. In the two tests, the PSIR lid did not detach from the IP.
- State Farm Insurance: ODI contacted State Farm for information related to the alleged defect. Since 1998, they have received 50 airbag-related inquiries for the subject vehicles. The majority were related to questions of what components require replacement after deployment and a small number concerned the PSIR deploying without the driver side deploying. State Farm has not received any inquiries associated with separation of the PSIR lid.

Based on the information obtained, ODI believes that the type (weld versus press) of bolts used, shape of the PSIR lid (curved), and the length of the tether cable may contribute to a PSIR lid detachment. It appears the press bolts, with a tensile strength of 640N/mm are less likely to separate than the weld bolts with a tensile strength of 320N/mm. Further, the length of the tether strap may contribute to whether the air bag will snag or catch onto the lid during deployment. ODI opines that a longer tether strap is less likely to snag or catch the air bag during deployment. While the foregoing may indicate the PSIR lid assembly is defective, ODI cannot conclude that the defect would be safety-related.

Testing of the PSIR system shows that a detached lid would travel upwards into the windshield. Any PSIR assembly pieces that may detach seem to travel above or away from passengers in the cars. Testing by VRTC could not identify any metallurgical defects in the bolts. Finally, ODI reviewed its defect investigation and safety recall databases to identify prior investigations with similar defects. ODI was unable to identify any recalls that may relate to this particular defect. However, ODI did identify two investigations that have some similarities to this case.

Investigation EA95-022 involved a situation where the passenger air bag module assembly allegedly detached from the instrument panel during air bag deployment in 1992-1994 Grand Marquis vehicles. In the Grand Marquis investigation, ODI identified eight failures of the air

bag module and two minor injuries. None of the failures involved the air bag module being projected or propelled towards a passenger during deployment. ODI ultimately closed the investigation because it could not identify a defect trend, nor could it state the alleged defect was related to motor vehicle safety.

Investigation EA 95-025 involved separation of the dash trim panel during air bag deployment in MY 1994-1995 Cadillac DeVille vehicles. In certain Cadillac DeVille vehicles, complainants reported that pieces from the dash trim panel would separate and project into an occupant. ODI identified approximately 33 alleged complaints and nine minor injuries. ODI closed this investigation after concluding that the potential for serious injuries from the broken trim pieces could not be demonstrated.

The PSIR lid issue is similar to the investigations with the Grand Marquis and Cadillac DeVille vehicles in the sense that ODI cannot identify a potential for serious injury from a detached PSIR lid. Here, the PSIR lid does not appear to project or travel into an occupant, nor do the pieces appear to travel or project into an occupant. There is only two known alleged vehicle failures, and ODI cannot conclude that an occupant would be struck and injured by the PSIR lid or associated parts.

**MANUFACTURER'S EVALUATION OF ALLEGED DEFECT:** In VW Information Request response letters to ODI dated September 15, 2003 and January 16, 2003, VW states that when the PSIR is deployed, the lid rotates upwards toward the front windshield. The lid stays between the deployed airbag and the windshield during a crash. It is the opinion of VW that the testing conducted to date and the absence of incidents in the field demonstrate that the condition that is the subject of this inquiry does not represent a defect and does not cause an unreasonable risk to the safety of vehicle occupants.

**REASON FOR CLOSING:** VW's PSIR lid may contain a defect because it may detach during deployment. However, ODI believes that further investigation would not likely find that the detachment of the PSIR lid and components pose a risk to safety because the PSIR lid travels upwards towards the windshield, rather than forwards into a passenger, during a detachment. ODI did not identify any case where the PSIR lid, or associated components, was or would be projected into a passenger during deployment of the airbag. Therefore, ODI concludes that there

is insufficient evidence to support the finding of a safety-related defect attributable to the detachment of the PSIR lid at this time.

Accordingly, this investigation is closed. The closing of this investigation does not constitute a finding by NHTSA that a safety-related defect does not exist. NHTSA reserves the right to take further action if warranted by the circumstances.