SAFETY COMPLIANCE TESTING FOR
FMVSS 124
ACCELERATOR CONTROL SYSTEMS

VOLKSWAGEN AG GERMANY
2007 VOLKSWAGEN RABBIT,
4-DOOR PASSENGER CAR
NHTSA NO. C75800

GENERAL TESTING LABORATORIES, INC.
1623 LEEDSTOWN ROAD
COLONIAL BEACH, VIRGINIA 22443

NOVEMBER 27, 2007

FINAL REPORT

PREPARED FOR

U. S. DEPARTMENT OF TRANSPORTATION
NATIONAL HIGHWAY TRAFFIC SAFETY ADMINISTRATION
ENFORCEMENT
OFFICE OF VEHICLE SAFETY COMPLIANCE
1200 NEW JERSEY AVE, SE
WASHINGTON, D.C. 20590
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Compliance tests were conducted on the subject 2007 Volkswagen Rabbit 4-door Passenger Car in accordance with the specifications of the Office of Vehicle Safety Compliance Test Procedure No. TP-124-06 for the determination of FMVSS 124 compliance.

Test failures identified were as follows: None
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SECTION 1
PURPOSE OF COMPLIANCE TEST

FMVSS 124 specifies requirements for the return of a vehicle’s throttle to the idle position when the driver removes the actuating force from the accelerator control, or in the event of a severance or disconnection in the accelerator control system. The purpose of FMVSS 124 is to reduce the number of deaths and injuries resulting from engine overspeed caused by malfunctions in the accelerator control system. This standard applies to passenger cars, multipurpose passenger vehicles (MPV’s), trucks and buses.
SECTION 2
TEST PROCEDURES AND DISCUSSION OF RESULTS

Compliance testing was conducted on a 2007 Volkswagen Rabbit 4-door Passenger Car, NHTSA No. C75201 in accordance with the National Highway Traffic Safety Administration (NHTSA) Laboratory Procedure TP-124-06.

The vehicle is equipped with an electronic throttle control system with an Accelerator Pedal Position Sensor (APS), a Throttle Plate Position Sensor (TPS), an Electronic control Module (ECM) and an Air Throttle Plate Actuator Motor.

Output from the vehicle throttle position sensor on the air throttle plate shaft was used to measure throttle position and data was recorded at 100 HZ with GTL’s data acquisition system. Testing was conducted to simulate the normal removal of the driver's foot from the accelerator pedal. This was performed by depressing the accelerator with a gloved hand which incorporated an electrical contact strip in the depressing forefinger. The accelerator was depressed to the required amount and then the forefinger was quickly removed from the pedal, releasing the accelerator and activating the contact strip for time zero. Failures (excluding spring disconnect) were induced simultaneously with release of the accelerator pedal. Testing was performed with the vehicle in park and the engine running. Return to idle times were determined for four throttle plate positions (25%, 50%, 75% and 100%) with the accelerator control system complete and with each of the two APS return springs in the accelerator pedal assembly independently disconnected. Disconnection of the TPS spring would not allow any engine control by the accelerator pedal. With each of the wires to the APS and throttle plate position sensor disconnected and shorted to ground, return to idle times were determined at the worst case condition – wide open throttle (100%). In addition, tests
were conducted with the APS and TPS connectors disconnected.

Some system faults resulted in no data output as the TPS used for throttle position data was itself disconnected for that part of the test. For these cases, return to idle state or limp-home mode was determined by laboratory personnel observation. A number of induced failures resulted in the throttle plate return to or below the idle state then shifting to a Limp-Home mode position which allows the vehicle to be removed from the roadway.

The return times for some normal operation and fault conditions resulted in return time greater than 1 second. In these cases, throttle angle position decreased rapidly followed by a controlled ramp down to the original idle position. Manufacturers sometimes use this ramp-down strategy for improved emission control which may be the case here. No engine “racing” was observed at any point in the testing.

This testing was performed at mid ambient temperature of 10º C to 46º C, in accordance with the NHTSA Test Procedure TP-124-06.
SECTION 3
COMPLIANCE TEST DATA

Test data for this test can be found on the following pages. Photographs are found in Section 5 and Test Plots are found in Section 6.
VEHICLE MY/MAKE/MODEL/BODY STYLE: 2007 VOLKSWAGEN RABBIT PSGR. CAR
VEHICLE NHTSA NO.: C75800
VEHICLE VIN: WVWCR71K67W131176
DATE OF TEST: AUGUST 20-22, 2007
TEST LAB: GENERAL TESTING LABORATORIES
VEHICLE ENGINE TYPE: GAS
GVWR: 1880 KG
VEHICLE ENGINE SIZE: 2.5 L 5 CYL
VEHICLE ACCEL. CONTROL SYSTEM (ACS) (Air or Fuel Throttled): AIR
MAX. BHP ENGINE SPEED: 150 HP
MFR. IDLE RPM: 675 RPM
FUEL METERING DEVICE (Carburetor, fuel injection, etc): FUEL INJECTION

REMARKS: None

RECORDED BY: G. FARRAND
DATE: 08/20/07
APPROVED BY: D. MESSICK
DATA SHEET 2
NORMAL OPERATION TEST
(fully operational system)

VEHICLE MY/MAKE/MODEL/BODY STYLE: 2007 VOLKSWAGEN RABBIT PSGR. CAR
VEHICLE NHTSA NO.: C75800
DATE OF TEST: AUGUST 22, 2007

Check one:
Mid Temp. Test: X Low Temp. Test: High Temp. Test:

SYSTEM CONDITION: COMPLETE (no modifications) Normal Operation

<table>
<thead>
<tr>
<th>GTL #</th>
<th>ACCELERATOR POSITION % WIDE OPEN THROTTLE (WOT)</th>
<th>THROTTLE POSITION SENSOR READING</th>
<th>RPM</th>
<th>TEMPERATURE (ºC)</th>
<th>ENGINE COOLANT</th>
<th>AMBIENT</th>
<th>THROTTLE POSITION SENSOR READING @ IDLE (BASELINE)</th>
<th>RETURN TIME TO IDLE (Msec)</th>
<th>PASS/FAIL</th>
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<tbody>
<tr>
<td>5761</td>
<td>25%</td>
<td>15%</td>
<td>675</td>
<td>86</td>
<td>23</td>
<td>2%</td>
<td>675</td>
<td>2810</td>
<td>*</td>
</tr>
<tr>
<td>5762</td>
<td>50%</td>
<td>28%</td>
<td>675</td>
<td>86</td>
<td>23</td>
<td>2%</td>
<td>675</td>
<td>3000</td>
<td>*</td>
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<tr>
<td>5763</td>
<td>75%</td>
<td>39%</td>
<td>675</td>
<td>86</td>
<td>23</td>
<td>2%</td>
<td>675</td>
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<td>5764</td>
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<td>81%</td>
<td>675</td>
<td>86</td>
<td>23</td>
<td>2%</td>
<td>675</td>
<td>3240</td>
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</table>

RETURN TIME REQUIREMENTS:

1 second (1000 ms) for vehicles less than 4536 kg.
2 seconds (2000 ms) for vehicles more than 4536 kg.
3 seconds (3000 ms) for vehicles exposed to -18º C or less

PASS * FAIL

REMARKS: When driver accelerator control is moved to 25, 50, 75 and 100% throttle positions, the throttle body butterfly only opens to a position as controlled by the engine control computer and oscillates open/close even though accelerator is held at a steady state.

* See Section 2 – Discussion of Results

RECORDED BY: G. FARRAND DATE: 08/22/07
APPROVED BY: D. MESSICK
FAIL-SAFE OPERATION DISCONNECTION

VEHICLE MY/MAKE/MODEL/BODY STYLE: 2007 VOLKSWAGEN RABBIT PSGR. CAR
VEHICLE NHTSA NO.: C75800
DATE OF TEST: AUGUST 23, 2007

Check one:

Mid Temp. Test: X   Low Temp. Test:   High Temp. Test:

SYSTEM CONDITION: #1 SPRING DISCONNECTED IN APS (INNER SPRING)

<table>
<thead>
<tr>
<th>GTL #</th>
<th>ACCELERATOR POSITION % WIDE OPEN THROTTLE (WOT)</th>
<th>THROTTLE POSITION SENSOR READING</th>
<th>RPM</th>
<th>TEMPERATURE (°C)</th>
<th>ENGINE COOLANT</th>
<th>AMBIENT</th>
<th>THROTTLE POSITION SENSOR READING @ IDLE (BASELINE)</th>
<th>RETURN TIME TO IDLE (Msec)</th>
<th>PASS/FAIL</th>
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<tr>
<td>5791</td>
<td>25%</td>
<td>12%</td>
<td>675</td>
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<td>28</td>
<td>2%</td>
<td>2%</td>
<td>2190</td>
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<tr>
<td>5792</td>
<td>50%</td>
<td>37%</td>
<td>675</td>
<td>86</td>
<td>28</td>
<td>2%</td>
<td>2%</td>
<td>3570</td>
<td>*</td>
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<tr>
<td>5793</td>
<td>75%</td>
<td>38%</td>
<td>675</td>
<td>86</td>
<td>28</td>
<td>2%</td>
<td>2%</td>
<td>3560</td>
<td>*</td>
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<tr>
<td>5794</td>
<td>100%</td>
<td>82%</td>
<td>675</td>
<td>86</td>
<td>28</td>
<td>2%</td>
<td>2%</td>
<td>3450</td>
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RETURN TIME REQUIREMENTS:

1 second (1000 ms) for vehicles less than 4536 kg.
2 seconds (2000 ms) for vehicles more than 4536 kg.
3 seconds (3000 ms) for vehicles exposed to -18° C or less

PASS ______*____   FAIL ____________

REMARKS:

* See Section 2 – Discussion of Results

RECORDED BY: G. FARRAND               DATE: 08/23/07
APPROVED BY: D. MESSICK
VEHICLE MY/MAKE/MODEL/BODY STYLE: 2007 VOLKSWAGEN RABBIT PSGR. CAR
VEHICLE NHTSA NO.: C75800
DATE OF TEST: AUGUST 23, 2007

Check one:
Mid Temp. Test: X Low Temp. Test: High Temp. Test:

SYSTEM CONDITION: #2 SPRING DISCONNECTED IN APS (OUTER SPRING)

<table>
<thead>
<tr>
<th>GTL #</th>
<th>ACCELERATOR POSITION % WIDE OPEN (WOT)</th>
<th>THROTTLE POSITION SENSOR READING</th>
<th>RPM</th>
<th>TEMPERATURE (ºC)</th>
<th>THROTTLE POSITION SENSOR READING @ IDLE (BASELINE)</th>
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<tr>
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<td>16%</td>
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<td>1710</td>
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<td>5796</td>
<td>50%</td>
<td>31%</td>
<td>675</td>
<td>86</td>
<td>2%</td>
<td>3630</td>
<td>*</td>
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<td>5797</td>
<td>75%</td>
<td>47%</td>
<td>675</td>
<td>86</td>
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<td>5798</td>
<td>100%</td>
<td>83%</td>
<td>675</td>
<td>86</td>
<td>2%</td>
<td>3530</td>
<td>*</td>
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</table>

RETURN TIME REQUIREMENTS:
1 second (1000 ms) for vehicles less than 4536 kg.
2 seconds (2000 ms) for vehicles more than 4536 kg.
3 seconds (3000 ms) for vehicles exposed to -18º C or less

PASS * FAIL

REMARKS:
* See Section 2 – Discussion of Results

RECORDED BY: G. FARRAND DATE: 08/23/07
APPROVED BY: D. MESSICK
VEHICLE MY/MAKE/MODEL/BODY STYLE: 2007 VOLKSWAGEN RABBIT PSGR. CAR
VEHICLE NHTSA NO.: C75800
DATE OF TEST: AUGUST 24, 2007

Check one:
Mid Temp. Test: X  Low Temp. Test:  High Temp. Test: 

SYSTEM CONDITION: SPRING REMOVED IN TPS

<table>
<thead>
<tr>
<th>GTL #</th>
<th>ACCELERATOR POSITION % WIDE OPEN THROTTLE (WOT)</th>
<th>THROTTLE POSITION SENSOR READING</th>
<th>RPM</th>
<th>TEMPERATURE (ºC) ENGINE COOLANT</th>
<th>AMBIENT</th>
<th>THROTTLE POSITION SENSOR READING @ IDLE (BASELINE)</th>
<th>RETURN TIME TO IDLE (Msec)</th>
<th>PASS/FAIL</th>
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<tbody>
<tr>
<td>25%</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>50%</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>75%</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>100%</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

RETURN TIME REQUIREMENTS:

1 second (1000 ms) for vehicles less than 4536 kg.
2 seconds (2000 ms) for vehicles more than 4536 kg.
3 seconds (3000 ms) for vehicles exposed to -18º C or less

PASS ___________  FAIL ___________

REMARKS: *Engine would not rev above limp home mode with spring #3 removed. Engine control computer would not let throttle butterfly open when accelerator was depressed.

RECORDED BY: G. FARRAND          DATE: 08/24/07
APPROVED BY: D. MESSICK
VEHICLE MY/MAKE/MODEL/BODY STYLE: 2007 VOLKSWAGEN RABBIT PSGR. CAR
VEHICLE NHTSA NO.: C75800
DATE OF TEST: AUGUST 22, 2007

<table>
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<th>ENGINE TEMP. ºC</th>
<th>% THROTTLE/RETURN TIME (MS)</th>
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<tr>
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<td>TPS</td>
<td>#1/PURPLE</td>
<td>OPEN</td>
<td>86</td>
<td>100/30</td>
<td>Limp Home @7%</td>
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<td>5766</td>
<td>TPS</td>
<td>#1/PURPLE</td>
<td>SHORT</td>
<td>86</td>
<td>100/40</td>
<td>Limp Home @7%</td>
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<tr>
<td>5767</td>
<td>TPS</td>
<td>#2/TAN</td>
<td>OPEN</td>
<td>86</td>
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<tr>
<td>5768</td>
<td>TPS</td>
<td>#2/TAN</td>
<td>SHORT</td>
<td>86</td>
<td>100/150</td>
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<td>5769</td>
<td>TPS</td>
<td>#3/YELLOW</td>
<td>OPEN</td>
<td>86</td>
<td>100/1660</td>
<td>*Limp Home @7%</td>
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<tr>
<td>5770</td>
<td>TPS</td>
<td>#3/YELLOW</td>
<td>SHORT</td>
<td>86</td>
<td>100/1630</td>
<td>*Limp Home @7%</td>
</tr>
<tr>
<td>5771</td>
<td>TPS</td>
<td>#4/GREEN</td>
<td>OPEN</td>
<td>86</td>
<td>100/0**</td>
<td>Limp Home</td>
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<td>5772</td>
<td>TPS</td>
<td>#4/GREEN</td>
<td>SHORT</td>
<td>86</td>
<td>100/0**</td>
<td>Limp Home</td>
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<tr>
<td>5773</td>
<td>TPS</td>
<td>#5/BLACK</td>
<td>OPEN</td>
<td>86</td>
<td>100/1470</td>
<td>*Limp Home @7% 3540 ms to 2%</td>
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<tr>
<td>5774</td>
<td>TPS</td>
<td>#5/BLACK</td>
<td>SHORT</td>
<td>86</td>
<td>100/0**</td>
<td>Limp Home</td>
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<td>5775</td>
<td>TPS</td>
<td>#6/BLACK#2</td>
<td>OPEN</td>
<td>86</td>
<td>100/0**</td>
<td>Limp Home</td>
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<td>5776</td>
<td>TPS</td>
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<td>SHORT</td>
<td>86</td>
<td>100/0**</td>
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<td>5777</td>
<td>TPS</td>
<td>CONNECTOR DISCONNECT</td>
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<td>APS</td>
<td>#7/WHT/BLACK</td>
<td>OPEN</td>
<td>86</td>
<td>100/3500</td>
<td>*</td>
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<tr>
<td>5779</td>
<td>APS</td>
<td>#7/WHT/BLACK</td>
<td>SHORT</td>
<td>86</td>
<td>100/30</td>
<td>Engine Started</td>
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<tr>
<td>5780</td>
<td>APS</td>
<td>#8/WHT/BLUE</td>
<td>OPEN</td>
<td>86</td>
<td>100/3580</td>
<td>*</td>
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<tr>
<td>5781</td>
<td>APS</td>
<td>#8/WHT/BLUE</td>
<td>SHORT</td>
<td>86</td>
<td>100/3500</td>
<td>*</td>
</tr>
<tr>
<td>5782</td>
<td>APS</td>
<td>#9/YEL/GREEN</td>
<td>OPEN</td>
<td>86</td>
<td>100/3520</td>
<td>*</td>
</tr>
<tr>
<td>5783</td>
<td>APS</td>
<td>#9/YEL/GREEN</td>
<td>SHORT</td>
<td>86</td>
<td>100/0**</td>
<td>Limp Home</td>
</tr>
<tr>
<td>5784</td>
<td>APS</td>
<td>#10/BLU/RED</td>
<td>OPEN</td>
<td>86</td>
<td>100/3570</td>
<td>*</td>
</tr>
<tr>
<td>5785</td>
<td>APS</td>
<td>#10/BLU/RED</td>
<td>SHORT</td>
<td>86</td>
<td>100/3450</td>
<td>*</td>
</tr>
<tr>
<td>5786</td>
<td>APS</td>
<td>#11/BLU/BRWN</td>
<td>OPEN</td>
<td>86</td>
<td>100/1680</td>
<td>*Limp Home @7%</td>
</tr>
<tr>
<td>5787</td>
<td>APS</td>
<td>#11/BLU/BRWN</td>
<td>SHORT</td>
<td>86</td>
<td>100/3810</td>
<td>*</td>
</tr>
<tr>
<td>5788</td>
<td>APS</td>
<td>#12/WHT/BLU</td>
<td>OPEN</td>
<td>86</td>
<td>100/3450</td>
<td>*</td>
</tr>
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<td>APS</td>
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<td>SHORT</td>
<td>86</td>
<td>100/3380</td>
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<td>CONNECTOR DISCONNECT</td>
<td>OPEN</td>
<td>86</td>
<td>100/0**</td>
<td>Engine Started</td>
</tr>
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REMARKS:

* See Section 2 – Discussion of Results

** Induced wire fault causes loss or throttle position sensor reading. Limp Home condition based on laboratory observation.
## SECTION 4
TEST EQUIPMENT LIST AND CALIBRATION INFORMATION

<table>
<thead>
<tr>
<th>EQUIPMENT</th>
<th>DESCRIPTION</th>
<th>MODEL/ SERIAL NO.</th>
<th>CAL. DATE</th>
<th>NEXT CAL. DATE</th>
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<td>CONTINUOUS RECORDER</td>
<td>OMEGA</td>
<td>CT485</td>
<td>06/07</td>
<td>06/08</td>
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<td>ENGINE RECORDING</td>
<td>GTL COMPUTER</td>
<td>CPU1</td>
<td>BEFORE USE</td>
<td>BEFORE USE</td>
</tr>
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<td>ENGINE RECORDING</td>
<td>MONARCH</td>
<td>1444664</td>
<td>08/07</td>
<td>08/08</td>
</tr>
<tr>
<td>SOFTWARE</td>
<td>GTL</td>
<td>N/A</td>
<td>BEFORE USE</td>
<td>BEFORE USE</td>
</tr>
<tr>
<td>CHAMBER</td>
<td>GTL</td>
<td>N/A</td>
<td>N/A</td>
<td>N/A</td>
</tr>
<tr>
<td>EXHAUST DUCT</td>
<td>GTL</td>
<td>N/A</td>
<td>N/A</td>
<td>N/A</td>
</tr>
</tbody>
</table>
2007 VOLKSWAGEN RABBIT
NHTSA NO. C75800
FMVSS NO. 124

FIGURE 5.3
RIGHT SIDE VIEW OF VEHICLE
MFD BY VOLKSWAGEN AG GERMANY 12/06
GVWR 4145 GAWR FRONT 2227/ REAR 2029 LBS
THIS VEHICLE CONFORMS TO ALL APPLICABLE U.S.
FEDERAL MOTOR VEHICLE SAFETY, BUMPER AND
THEFT PREVENTION STANDARDS IN EFFECT ON
THE DATE OF MANUFACTURE SHOWN ABOVE.

WVWCR71K67W131176 PASSENGER CAR

FIGURE 5.4
CLOSE-UP VIEW OF VEHICLE CERTIFICATION LABEL
### Tire and Loading Information

**Seating Capacity**: Total 5  
Front 2, Rear 3

**The Combined Weight of Occupants and Cargo Should Never Exceed 440 KG or 970 LBS**

<table>
<thead>
<tr>
<th>TIRE</th>
<th>SIZE</th>
<th>Cold Tire Pressure</th>
</tr>
</thead>
<tbody>
<tr>
<td>FRONT</td>
<td>195/65 R15</td>
<td>230 KPA, 34 PSI</td>
</tr>
<tr>
<td>REAR</td>
<td>195/65 R15</td>
<td>230 KPA, 34 PSI</td>
</tr>
<tr>
<td>SPARE</td>
<td>195/65 R15</td>
<td>230 KPA, 34 PSI</td>
</tr>
</tbody>
</table>

**See Owner's Manual for Additional Information**
2007 VOLKSWAGEN RABBIT
NHTSA NO. C75800
FMVSS NO. 124

FIGURE 5.6
TOP VIEW OF THROTTLE BODY
FIGURE 5.7
SIDE VIEW OF THROTTLE BODY
2007 VOLKSWAGEN RABBIT
NHTSA NO. C75800
FMVSS NO. 124

FIGURE 5.8
THROTTLE BODY MOTOR AND POSITION SENSOR
FIGURE 5.9
THROTTLE PLATE RETURN SPRING
FIGURE 5.10
THROTTLE PLATE RETURN SPRING
FIGURE 5.11
THROTTLE BODY TEST SET-UP
FIGURE 5.12
ACCELERATOR PEDAL ASSEMBLY
FIGURE 5.14
ACCELERATOR PEDAL ASSEMBLY

2007 VOLKSWAGEN RABBIT
NHTSA NO. C75800
FMVSS NO. 124
ACCELERATOR RETURN SPRING
#1 INSIDE
#2 OUTSIDE

FIGURE 5.15
ACCELERATOR RETURN SPRINGS
ACCELERATOR RETURN SPRING

#1 INSIDE

AND

#2 OUTSIDE
2007 VOLKSWAGEN RABBIT
NHTSA NO. C75800

FIGURE 5.17
OVERALL TEST SET-UP
GTL 5762, FMVSS 124

Normal Operation, 50% Throttle.

% Throttle & Foot Release.

Time in Seconds
GTL 5764, FMVSS 124
Normal Operation, 100% Throttle.
GTL 5769, FMVSS 124
TPS Wire 3 Open, 100% Throttle.

% Throttle & Foot Release.

Time in Seconds
GTL 5772, FMVSS 124

TPS Wire 4 Shorted, 100% Throttle.
GTL 5773, FMVSS 124

TPS Wire 5 Open, 100% Throttle.
GTL 5774, FMVSS 124

TPS Wire 5 Shorted, 100% Throttle.

% Throttle & Foot Release

Time in Seconds
GTL 5775, FMVSS 124
TPS Wire 6 Open, 100% Throttle.

% Throttle & Foot Release.

Time in Seconds
GTL 5778, FMVSS 124
APS Wire 7 Open, 100% Throttle.
GTL 5780, FMVSS 124
APS Wire & Open, 100% Throttle.
GTL 5782, FMVSS 124
APS Wire 9 Open, 100% Throttle.
GTL 5784, FMVSS 124

APS Wire 10 Open, 100% Throttle.

% Throttle & Foot Release.

Time in Seconds
GTL 5786, FMVSS 124

APS Wire 11 Open, 100% Throttle.

% Throttle & Foot Release.

Time in Seconds
GTL 5790, FMVSS 124

APS Connector Disconnect, 100% Throttle.

% Throttle & Foot Release:

Time in Seconds:

-0.5 -0.4 -0.3 -0.2 -0.1 0 0.1 0.2 0.3 0.4 0.5
GTL 5791, FMVSS 124
APS Spring #1 Removed, 25% Throttle.
GTL 5794, FMVSS 124
APS Spring #1 Removed. 100% Throttle.
GTL 5795, FMVSS 124

APS Spring 2 Disconnected, 25% Throttle.

% Throttle & Foot Release.

Time in Seconds
SECTION 7
MANUFACTURER’S DRAWINGS
VEHICLE INFORMATION / TEST SPECIFICATIONS
FMVSS No. 124
Gasoline Engines

Requested Information:

1. A sketch of the driver operated accelerator control system (ACS) starting from the accelerator pedal up to and including the fuel metering device (carburetor, fuel injectors, fuel distributor, or fuel injection pump).

Figure 1: Schematic representation of the ACS of a gasoline passenger car

<table>
<thead>
<tr>
<th>APS</th>
<th>Accelerator Pedal Position Sensor</th>
</tr>
</thead>
<tbody>
<tr>
<td>ECM</td>
<td>Electronic Control Module</td>
</tr>
<tr>
<td>TPS</td>
<td>Throttle Plate Position Sensor</td>
</tr>
</tbody>
</table>

2. For Normal ACS operation, the method utilized to determine the engine idle state (air throttle plate position, fuel delivery rate, other).

The electronic throttle valve is adjusted by an electric motor which moves the throttle valve over the complete range from zero to full open throttle. The driver depresses the accelerator pedal which corresponds to the driver’s requested engine torque. The accelerator pedal position is captured by a signal from the pedal sensor system. This activates the throttle valve adjustment motor and adjusts the throttle valve from a closed to open position in direct response to driver input. With the information from the throttle valve position sensor system the throttle valve position can be determined at any time.
3. For Fail-Safe operation of the ACS (disconnection or severance), the method utilized to determine return of engine power to the idle state (air throttle plate position, fuel delivery rate, air intake, engine rpm, other)

Both energy sources, the throttle valve adjustment motor and the throttle valve return spring work independently from one another and are alone able to return the throttle valve in a idle position over the complete temperature range from +52°C to −40°C.

4. Is the vehicle ACS equipped with any of the following:
   A. Accelerator Pedal Position Sensor (APS)
   B. Throttle Plate Position Sensor (TPS)
   C. Electronic Control Module (ECM)
   D. Air throttle plate actuator motor

   The vehicle ACS is equipped with all from A to D.

5. If air throttle plate equipped, is there a procedure which can be utilized by the test laboratory to measure the position of the throttle plate by tapping into the TPS or ECM? If so, please describe.

   The throttle valve housing includes the throttle valve position sensor system. A wire adapter can be positioned between the throttle valve housing and the wire harness in the engine compartment to measure the voltage. The voltage recorded provides a measure to definitely determine the throttle valve position.

6. Point(s) chosen to demonstrate compliance with FMVSS No. 124 for single point disconnect and severance.

   Should the throttle valve adjustment motor loose voltage, the throttle valve returns within the specified time period, by means of the throttle valve return spring in the throttle valve housing, to a predetermined idle position.

   If there is a disconnected wire at the accelerator pedal, the throttle valve adjustment motor and the throttle valve return spring together return the throttle valve to the predetermined idle position.

7. Where applicable, were connections in the ACS beyond the ECM such as the fuel injectors tested for disconnection and severance. If yes, provide details.

   By air regulated engines (λ=1) the air mass is the controlling quantity and is dependent on the throttle valve so that the throttle valve and not the injectors is the relevant component.
8. Where applicable, were idle return times tested for electrical severance accompanied by shorting to ground? If yes, please provide details.

The redundant and diverse energy sources in the throttle valve are independent. Each of them is able to bring the throttle valve at any time back to the predetermined idle setting. The reset times are determined as follows:

During the depressing of the accelerator pedal with an operating unit and switch will t electically opened (see Figure 2). Then the accelerator pedal is quickly released, at which time the switch closes, and that signal is the trigger for the timing of the measurement.

Figure 2: Operating means for accelerator pedal movement.
To test the throttle valve adjustment motor and the throttle plate independently from the return spring, the return spring is released. Figure 3 shows such a throttle valve.
Figure 3: Throttle valve with return spring released (not actuated fully opened). Using the measuring technique represented in Figure 4, the timing of the throttle valve movement to the idle operating position can be noted and evaluated.

Figure 4: Schematic representation of measuring technique. To test the function of the return spring in the throttle valve housing a complete throttle valve with return spring is used and the voltage supply to the throttle valve adjustment motor is cut-off. The time required for the throttle valve to return to the idle position is evaluated and analyzed.
9. All sources of return energy (springs) for the accelerator pedal and if applicable, the air throttle plate.

Accelerator Pedal - The accelerator pedal has two redundant working springs that return the pedal to the starting position.

Throttle Valve - The throttle valve adjustment motor is an electric motor that opens or closes the throttle valve in response to driver input and is capable of doing so even in the event that the throttle valve return spring is defective. If the voltage supply is interrupted or if the electric motor is defective, the throttle valve return spring brings the throttle valve back to the predetermined idle position.

10. If fuel delivery rate is used to demonstrate return to idle state, provide:

   A. The method used to measure this signal i.e. connection to standard SAE J1587 data bus.
   B. Equipment required to measure signal.

In air flow regulated engines the air mass is the power controlling quantity and this is dependent on the throttle valve which is the test relevant part and not the injectors.

A. The fuel supply is not measured on air regulated engines.
B. None

11. Fuel rate signal output range at the idle state.

   None. See above.

12. Is the ACS equipped with a limp home mode? If yes, provide operation description.

   Yes. A limp mode to permit the vehicle to drive home is included. In case of a failure, the engine speed and the engine torque will be automatically reduced and continued driving at reduced engine output is possible.

13. Method by which the test laboratory can record engine RPM by connection to ECM, OBD connector, etc.

   The engine RPM can be recorded with a generic scan tool in address 33 (scan-tool OBD) in mode 1 pid $0c. The scan tool should be connected to the OBD socket.