REPORT NUMBER 114-GTL-10-005

SAFETY COMPLIANCE TESTING FOR FMVSS NO. 114 THEFT PROTECTION

VOLVO CAR CORPORATION
2010 VOLVO S40, PASSENGER CAR
NHTSA NO. CA5900

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

May 14, 2010

FINAL

PREPARED FOR

U. S. DEPARTMENT OF TRANSPORTATION
NATIONAL HIGHWAY TRAFFIC SAFETY ADMINISTRATION
ENFORCEMENT
OFFICE OF VEHICLE SAFETY COMPLIANCE
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15. Supplementary Notes

16. Abstract

Compliance tests were conducted on the subject 2010 Volvo S40 4-door Passenger Car in accordance with the specifications of the Office of Vehicle Safety Compliance Test Procedure No. TP-114-03-DRAFT-GTL-REVC for the determination of FMVSS 114 compliance.

Test failures identified were as follows:
None

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SECTION 1

PURPOSE OF COMPLIANCE TEST

1.0 PURPOSE OF TEST

A model year 2010 Volvo S40 Passenger Car was subjected to Federal Motor Vehicle Safety Standard (FMVSS) No. 114 testing to determine if the vehicle was in compliance with the requirements of the standard. FMVSS 114 specifies requirements to decrease the likelihood that a vehicle is stolen, or accidentally set in motion.

1.1 The test vehicle was a 2010 Volvo S40 Passenger Car. The vehicle was identified as follows:

A. Vehicle Identification Number: YV1382MS9A2493156

B. NHTSA No.: CA5900

C. Manufacturer: VOLVO CAR CORPORATION

D. Manufacture Date: 09/09

E. Color: White

1.2 TEST DATE

The test vehicle was subjected to FMVSS No. 114 testing on March 24, 2010.

SECTION 2

TEST PROCEDURE AND SUMMARY OF RESULTS

2.0 TEST PROCEDURE

All tests were conducted in accordance with NHTSA, Office of Vehicle Safety Compliance (OVSC) Laboratory Procedure TP-114-03-DRAFT-GTL-REVC and General Testing Laboratories, Inc. (GTL) Test Procedure, TP-114-03-Draft, “Theft Protection and Rollaway Prevention”.

2.1 SUMMARY OF RESULTS

Test data indicate the FMVSS 114 requirements appear to have been satisfied. All test data resulting from the tests were recorded on test data sheets in Section 3.

SECTION 3

TEST DATA

3.0 TEST RESULTS

The following data sheets document the results of FMVSS 114 testing on the 2010 Volvo S40.

FMVSS 114, THEFT PROTECTION
DATA SHEET 1 – VEHICLE IDENTIFICATION

TEST DATE: 03/25/10 LAB.: General Testing Laboratories
CONTRACT: DTNH22-06-C-00032 VEH. NHTSA NO.: CA5900
VIN: YV1382MS9A2493156 BUILD DATE: 09/09

MY/MAKE/MODEL/BODY STYLE: 2010 Volvo S40

TRANSMISSION TYPE:
Automatic ____; Manual __X__; Other ____ (describe: _____)

DRIVE TRAIN TYPE:
Front Wheel __X__; Rear Wheel _____; 4-Wheel _____

FUEL TANK LEVEL: 100 (% OF max.) MILEAGE: 143

VEHICLE STARTING SYSTEM:

Location of the starting system:
Located on Dash to the Right Side of Steering Column

Selectable settings:
Off(lock), Accessory, On(run), Start

Explain how the system is activated:
The system is activated when the electronic key FOB is inserted into receptacle on dash and turned to the crank position with brake(automatic transmission in “P” or “N”) depressed or clutch (manual transmission) depressed.

KEY

Description of the key:
Electronic Key FOB with embedded code

STARTING SYSTEM ACTIVATION

Describe how the key is inserted into the starting system:
Electronic key FOB is inserted into receptacle on dash

Describe how the key is used to activate the starting system:
Turn electronic key FOB to the right (clockwise) to activate system.

Describe how the key is removed from the starting system:
Remove Electronic Key FOB by pulling it out of receptacle on dash.

FMVSS 114, THEFT PROTECTION
DATA SHEET 1 continued

GEAR SELECTION CONTROL

Describe the gear selection control:
Manual 5 speed Shift Lever with traditional "H" pattern.

Describe how the gear selection control is activated:
Depress clutch pedal and move gear selector to desired position.

Describe all of the selectable settings:
1^{st} , 2^{nd} , 3^{rd} , 4^{th} , 5^{th} , Neutral, Reverse

IMMOBILIZER

Is the vehicle equipped with an immobilizer YES X NO

Describe the immobilizer device and how it prevents vehicle theft (if equipped):
The immobilizer system is distributed between different modules and inhibits ignition fuel supply and cranking if the electronic code in the key doesn't match the code in the modules.

OPTIONAL RELEASE DEVICES

Describe if the vehicle is equipped with optional release devices:
N/A

OPTIONAL RELEASE DEVICES:

Key Removal Gear Selection Control None X Other

VEHICLE FLUIDS

Check all vehicle fluids and adjust to the proper levels for operation: Full

VEHICLE TIRE PLACARD INFORMATION

Vehicle Mfg. Recommended Tire Inflation Pressure
(kPa): Front 240 Rear 240

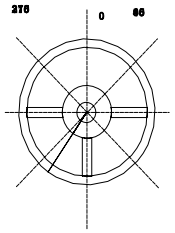
TIRE INFLATION PRESSURES:

Measured (kPa): LF 240 LR 240 RF 240 RR 240

WEIGHT

Vehicle Curb Weight(kg): 1443 Weight of Driver (kg): 91 (target = 91kg)

FMVSS 114, THEFT PROTECTION
DATA SHEET 2

REQUIREMENT S5.1.1	PASS	FAIL
Engine cannot be started without using the key _X_Yes ____No	X	
With key removed, steering wheel locks: Yes: ____ No:_X_ Note: Identify locking position(s) on wheel using arrow(s) Clockwise: _____ (degrees) Counterclockwise:_____ (degrees) 		
Key removal prevents forward self-mobility: Yes:___X___ No:_____ If yes describe: Vehicle will not start without the correct electronic key FOB.		
When key is removed from the starting system, starting of the engine or motor and either steering or self mobility is prevented. YES	X	

REMARKS:

FMVSS 114, THEFT PROTECTION
DATA SHEET 2 continued

REQUIREMENT S5.1.3	PASS	FAIL
An audible warning is activated whenever the key is in any starting system position with the exception of "on" and "start" and the door closest to the driver's designated seating position is opened. Yes__X__ No ___ Identify ALL key/starting system position setting: OFF, ACCESSORY, ON, START	X	

REQUIREMENT S5.1.4	PASS	FAIL
With the vehicle engine or motor shut down and the transmission gear selection control in any position other than "park"; The steering wheel can rotate without locking? Yes_____ No_____ NOTE: Engine cannot be turned off by push button if gear selector is not in the park position.	N/A	
The vehicle is free to roll forward? Yes_____ No_____	N/A	

REMARKS: Manual Transmission

RECORDED BY: G. Farrand DATE: 03/25/10
APPROVED BY: D. Messick

FMVSS 114, ROLLAWAY PREVENTION
DATA SHEET 3
(for vehicles equipped with transmission with a “park” position)

VEH. NHTSA NO.: CA5900 TEST DATE: 03/25/10

REQUIREMENT S5.2.1	PASS	FAIL
The starting system prevents key removal in ALL gear selection control positions except “park”. Yes_____ No_____ Can the gear selection control be placed between each gear selection position and will it remain there without assistance? Yes_____ No____ If yes, can the key be removed from the starting system? Yes_____ No____ If the key can be removed from the vehicle starting system when the gear selection control is not locked in “park”, a mechanism shall exist which, upon key removal, the vehicle transmission or gear selection control shall become locked in “park” as the direct result of removing the key. If such a mechanism exists, describe the mechanism and its function:	N/A	

REQUIREMENT S5.2.2	PASS	FAIL
The gear selection control is locked in the “park” position when the key is removed from the starting system. Yes_____ No_____	N/A	

REMARKS: Manual Transmission

DATA SHEET 3 continued

REQUIREMENT S5.2.3	PASS	FAIL
ELECTRICAL FAILURE (Battery Discharge) In the event of an electrical failure, key removal from the starting system when the transmission or gear selection control is not locked in “park” is permitted”. Yes_____ No____		
The vehicle is equipped with an override device that permits key removal from the starting system when the transmission or gear selection control is not locked in “park”. Yes_____ No___		
If yes, select the type of override device equipped: Opaque Cover_____ No Cover_____ Describe the override device design and mode of activation (if equipped):	N/A	
FILL IN THE SECTION BELOW THAT APPLIES: OVERRIDE WITH AN OPAQUE COVER: The opaque surface cover prevents sight of and use of override device. Yes_____ No_____ The opaque surface cover can only be removed by using a screwdriver or other tool. Yes_____ No_____ As a direct result of removing the key from starting system, the following is prevented: Steering_____ or Self-Mobility_____ OVERRIDE WITH NO COVER The override device requires the use of a tool to activate. Yes_____ No_____ Simultaneous activation of the override device and removal of key from starting system is required. Yes_____ No_____ As a direct result of removing the key from the starting system, the following is prevented: Steering_____ or Self-Mobility_____	N/A N/A	

REMARKS: Manual Transmission

DATA SHEET 3 continued

REQUIREMENT S5.2.4	PASS	FAIL
GEAR SELECTION CONTROL OVERRIDE DEVICE The vehicle is equipped with an override device that allows the user to move the gear selection control from "park" after the key has been removed from the starting system. Yes____ No____ If yes, select the type of override device that is equipped: Override operated with a: Key_____ Opaque Cover_____ No Cover_____ Describe the override device design and mode of activation (if equipped): **FILL IN THE SECTION BELOW THAT APPLIES:** OVERRIDE OPERATED WITH KEY: The key is required to operate the override device that allows the user to move the gear selection control from "park" after the key has been removed from the starting system. Yes_____ No_____ OVERRIDE WITH AN OPAQUE COVER The opaque surface cover prevents sight of and use of override device. Yes____ No____ The opaque surface cover can only be removed by using a screwdriver or other tool. Yes_____ No____ As a direct result of removing the key from the starting system, the following is prevented: Steering _____ or Self-Mobility____ OVERRIDE WITH NO COVER The override device requires the use of a tool to operate. Yes_____ No_____ Simultaneous activation of the override device and removal of key from starting system is required. Yes_____ No_____ As a direct result of removing the key from the starting system, the following is prevented: Steering_____ or Self-Mobility_____	N/A N/A N/A	

REMARKS: Manual Transmission

DATA SHEET 3 continued

REQUIREMENTS S5.2.5	PASS	FAIL
VEHICLE FACING UPHILL ON 10% GRADE With the gear selection control in “park” measure movement of the vehicle down the slope upon releasing the service brake. Test grade: _____ % (9% to 15%) Measured movement:_____ mm (150mm maximum) **NOTE:** Repeat procedure if vehicle fails on grade in excess of 10%. Test grade: _____ % (9% to 10%) Measured movement: _____ mm (150 mm maximum)	N/A	see note
VEHICLE FACING DOWNHILL ON 10% GRADE With the gear selection control in “park” measure movement of the vehicle down the slope upon releasing the service brake. Test grade: _____ % (9% to 15%) Measured movement:_____ mm (150mm maximum) **NOTE:** Repeat procedure if vehicle fails on grade in excess of 10%. Test grade: _____ % (9% to 10%) Measured movement: _____ mm (150 mm maximum)	N/A	

REMARKS: Manual Transmission

DATA SHEET 3 continued

REQUIREMENTS S5.3	PASS	FAIL
VEHICLE FACING UPHILL ON 10% GRADE		
With the key in the "off" position, the transmission will shift out of "park" without the service brake being applied. Yes_____ No	N/A	
With the key in the "acc" position, the transmission will shift out of "park" without the service brake being applied. Yes_____ No	N/A	
With the key in the "on" position (engine off), the transmission will shift out of "park" without the service brake being applied. Yes____ No	N/A	
With the key in the "start" position, the transmission will shift out of "park" without the service brake being applied. Yes_____ No	N/A	
With the key in the "other" position (please specify), the transmission will shift out of "park" without the service brake being applied. Yes_____ No_____	N/A	
Does the key stay between starting system positions without being held by operator? Yes_____ No If so, please describe.	N/A	
Brake force readings (force required to allow the transmission to shift out of "park"):		
The vehicle is equipped with adjustable pedals: Yes_____ No		
Fore Position: Aft Position (if applicable)		
Reading 1 ____N Reading 1_____ Reading 2 ____N Reading 2_____ Reading 3 ____N Reading 3_____ Reading 4 ____N Reading 4_____ Reading 5 ____N Reading 5_____ Avg. ____N Avg. _____	N/A	

REMARKS: Manual Transmission

RECORDED BY: G. Farrand DATE: 03/25/10

APPROVED BY: D. Messick

SECTION 4
TEST EQUIPMENT LIST

ITEM	MFR	MODEL	S/N	CAL. PERIOD	DATE OF NEXT CALIB.	REMARKS
SLR DIGITAL CAMERA	NIKON	D50	N/A	N/A	N/A	
TIRE PRESSURE GAUGE	WESKLER	45-0/100	107	12 MO.	04/03/10	
INCLINOMETER	MITUTOYO	PRO 360	950-315	N/A	BEFORE USE	
STEEL TAPE	STANLEY	FAT MAX	33-890	12 MO.	03/29/10	
WHEEL SCALES	INTERCOMP	SERIES 94	199744	12 MO.	03/02/11	
WHEEL SCALES	INTERCOMP	SERIES 94	199744	12 MO.	03/02/11	
WHEEL SCALES	INTERCOMP	SERIES 94	199744	12 MO.	03/02/11	
WHEEL SCALES	INTERCOMP	SERIES 94	199744	12 MO.	03/02/11	
SPRING SCALE	CHATILLON	DPP-10	4729	12 MO.	BEFORE USE	

SECTION 5

PHOTOGRAPHS

2010 VOLVO S40
NHTSA NO. CA5900
FMVSS NO. 114

FIGURE 5.1
¾ FRONTAL VIEW FROM LEFT SIDE OF VEHICLE

2010 VOLVO S40
NHTSA NO. CA5900
FMVSS NO. 114

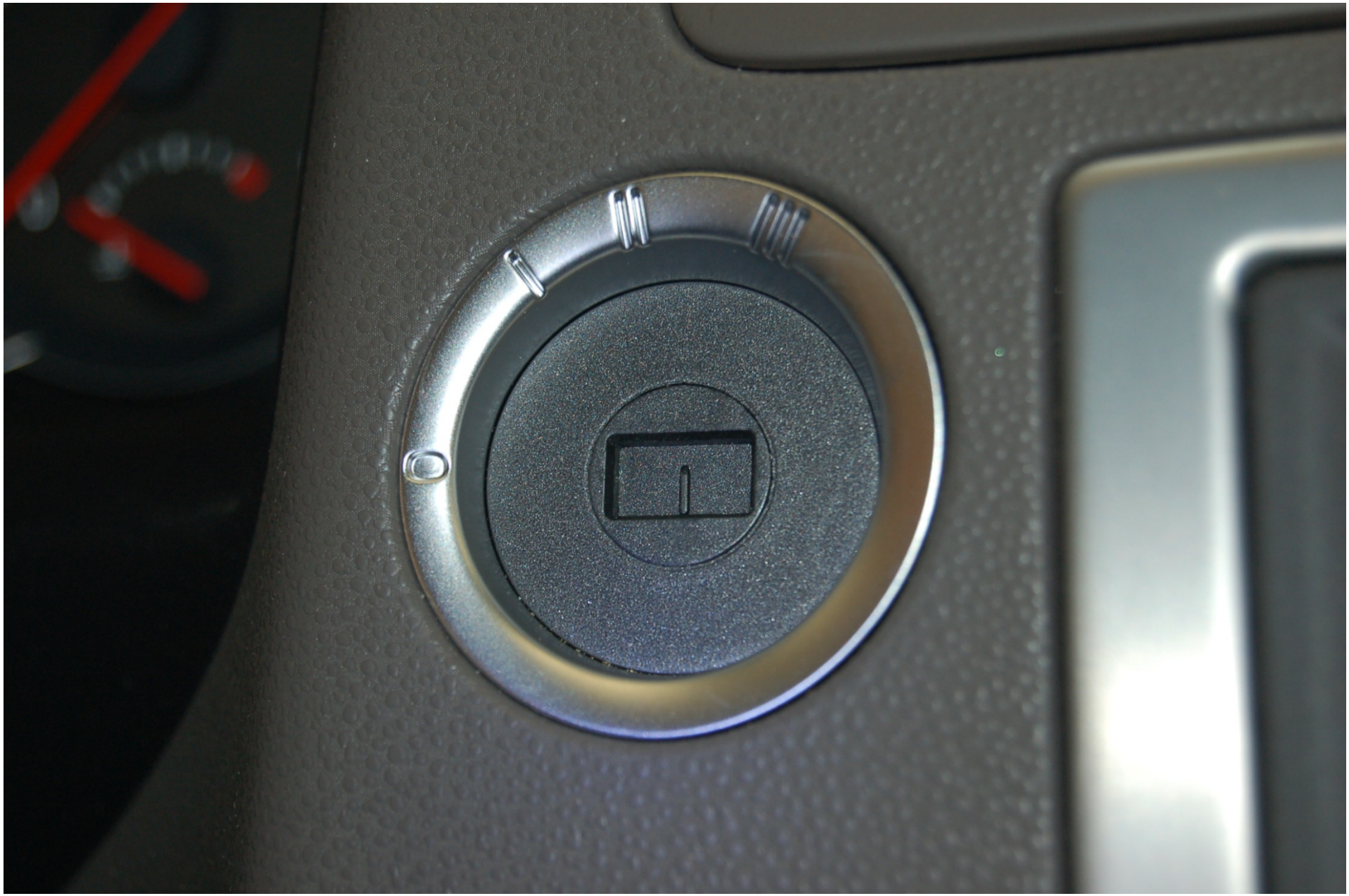
FIGURE 5.2
VEHICLE CERTIFICATION LABEL

2010 VOLVO S40
NHTSA NO. CA5900
FMVSS NO. 114

FIGURE 5.3
VEHICLE TIRE INFORMATION LABEL

2010 VOLVO S40
NHTSA NO. CA5900
FMVSS NO. 114

FIGURE 5.4
CLOSE-UP VIEW OF IGNITION KEY



2010 VOLVO S40
NHTSA NO. CA5900
FMVSS NO. 114

FIGURE 5.5
STARTING SYSTEM CONTROL

2010 VOLVO S40
NHTSA NO. CA5900
FMVSS NO. 114

FIGURE 5.6
TRANSMISSION GEAR SELECTION CONTROL