REPORT NUMBER 103-GTL-07-002

SAFETY COMPLIANCE TESTING FOR FMVSS NO. 103 WINDSHIELD DEFROSTING AND DEFOGGING SYSTEMS

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

GENERAL TESTING LABORATORIES, INC.
1623 LEEDSTOWN ROAD
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MARCH 3, 2008

FINAL REPORT

PREPARED FOR

U. S. DEPARTMENT OF TRANSPORTATION
NATIONAL HIGHWAY TRAFFIC SAFETY ADMINISTRATION
ENFORCEMENT
OFFICE OF VEHICLE SAFETY COMPLIANCE
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WASHINGTON, D.C. 20590

Technical Report Documentation Page

1. Report No. 103-GTL-07-002	2. Government Accession No. N/A	3. Recipient's Catalog No. N/A
4. Title and Subtitle Final Report of FMVSS 103 Compliance Testing of 2007 VOLKSWAGEN RABBIT, PASSENGER CAR NHTSA No. C75800		5. Report Date March 3, 2008 6. Performing Organ. Code GTL
7. Author(s) Grant Farrand, Project Engineer Debbie Messick, Project Manager		8. Performing Organ. Rep# GTL-DOT-07-103-002
9. Performing Organization Name and Address General Testing Laboratories, Inc. 1623 Leedstown Road Colonial Beach, Va 22443		10. Work Unit No. (TRAIS) N/A 11. Contract or Grant No. DTNH22-06-C-00032
12. Sponsoring Agency Name and Address U.S. Department of Transportation National Highway Traffic Safety Administration Enforcement Office of Vehicle Safety Compliance (NVS-220) 1200 New Jersey Ave., S.E. Washington, DC 20590		13. Type of Report and Period Covered Final Test Report October 17-18, 2007 14. Sponsoring Agency Code NVS-220
15. Supplementary Notes		
16. Abstract Compliance tests were conducted on the subject, 2007 Volkswagen Rabbit Passenger Car in accordance with the specifications of the Office of Vehicle Safety Compliance Test Procedure No. TP-103-13 for the determination of FMVSS 103 compliance. Test failures identified were as follows: None		
17. Key Words Compliance Testing Safety Engineering FMVSS 103	18. Distribution Statement Copies of this report are available from NHTSA Technical Information Services (TIS) NPO-411 1200 New Jersey Ave., S.E. Washington, DC 20590 Email: tis@dot.gov Fax: 202-493-2833	
19. Security Classif. (of this report) UNCLASSIFIED	21. No. of Pages 31	22. Price
20. Security Classif. (of this page) UNCLASSIFIED		

Form DOT F 1700.7 (8-72)

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SECTION 1

PURPOSE OF COMPLIANCE TEST

1.0 PURPOSE OF COMPLIANCE TEST

A 2007 Volkswagen Rabbit Passenger Car was subjected to Federal Motor Vehicle Safety Standard (FMVSS) No. 103 testing to determine if the vehicle was in compliance with the requirements of the standard. All tests were conducted in accordance with NHTSA, Office of Vehicle Safety Compliance (OVSC) Laboratory Procedure, TP-103-13 dated 26 June 1996 and General Testing Laboratories, Inc. (GTL) Test Procedure, "Windshield Defrosting and Defogging Systems – Passenger Vehicles, Mulitpurpose Vehicles, Trucks and Buses".

1.1 TEST VEHICLE

The test vehicle was a 2007 Volkswagen Rabbit Passenger Car. Nomenclature applicable to the test vehicle are:

A. Vehicle Identification Number: WVWCR71K67W131176

B. NHTSA No.: C75800

C. Manufacturer: VOLKSWAGEN AG GERMANY

D. Manufacture Date: 12/06

1.2 TEST DATE

The test vehicle was subjected to FMVSS No. 103 testing on October 17-18, 2007.

SECTION 2

COMPLIANCE TEST PROCEDURE AND SUMMARY OF RESULTS

2.0 GENERAL

The 2007 Volkswagen Rabbit 4-door passenger car, NHTSA No. C75800 was subjected to FMVSS No. 103 tests on October 17-18, 2007. Photographs of the test vehicle are shown in Figures 5.1 through 5.4. The manufacturer's certification and tire information labels are shown in Figures 5.5 and 5.6. The test instrumentation and instrument panel setups are depicted in Figures 5.7 and 5.8. Figures 5.9 through 5.14 depict the windshield pre and post test defrost conditions.

2.1 TEST PROCEDURE

Prior to test the test vehicle was inspected for completeness, systems operability, and appropriate fuel and liquid levels, i.e., oil and coolant to include antifreeze protection. The vehicle was then photographically documented as required by the DOT/NHTSA test procedure. The windshield patterns for areas A, B, C, and D had been furnished prior to testing and these areas were outlined on the windshield with a marker. The vehicle was then installed in the cold chamber and pre-conditioned for a 14-hour minimum, 0º ±5º F temperature soak for the first test run. After the pre-condition, the hood was raised to assure engine coolant and lubricant were stabilized within the test temperature range for a minimum of 2 hours.

At the end of the 2-hour minimum stabilization period, the entire windshield was sprayed evenly with 0.010 ounces of water per square inch of glass area. Refer to Section 3, Compliance Test Data, for test specifics such as total amount of water sprayed, spray gun identification, and air pressure regulation. The vehicle soak continued for an additional 30 minutes minimum but no more than 40 minutes after the windshield was sprayed.

At the conclusion of the additional soak time the vehicle's engine was started and operated at a target speed of 1500-1600 rpm or at the manufacturer's specification if different as noted on data sheets. The defroster blower was turned on to the high speed setting with the heater selector in the de-ice (defrost) position, and the temperature control in the maximum temperature position. All doors and windows were closed. The heater air intake was fully open and the vehicle's hood closed. At no time during the test were the windshield wipers used.

SECTION 2 continued

At start of testing and during test, at each 5-minute interval after engine start, cold chamber, engine coolant, heater coolant in and defroster air left/defroster air right temperatures were recorded. Likewise at each 5-minute interval the boundary of the defrosted area was marked on the inside surface of the windshield. The test was run for a maximum of 40 minutes from engine start, or until such time as 100 percent windshield clearance was achieved. Photographs were made of the windshield at the pre-test frosted state and 20-minute and 25-minute intervals. Post test actions included placing a vellum pattern on the windshield and tracing the windshield's 5-minute interval defrosted area boundary lines onto the vellum pattern.

After the traces were obtained, the windshield was again thoroughly cleaned and the vehicle engine coolant and lubricant stabilization period at 0º ± 5º F temperature commenced for a repeat of the procedure discussed. The windshield patterns for both tests were used subsequently to determine the cleared area percentages.

2.2 SUMMARY OF RESULTS

Based on the test performed, the test vehicle appears to be in compliance with the requirements of FMVSS 103.

SECTION 3

COMPLIANCE TEST DATA

3.0 TEST RESULTS

The following data sheets document the results of testing on the 2007 Volkswagen Rabbit.

SUMMARY DATA SHEET
FMVSS 103, WINDSHIELD DEFROSTING AND DEFOGGING SYSTEMS

VEH. MOD YR/MAKE/MODEL/BODY: 2007 VOLKSWAGEN RABBIT PASSENGER CAR
VEH. NHTSA NO: C75800; VIN: WVWCR71K67W131176
VEH. BUILD DATE: 12/06 TEST DATE: OCTOBER 17-18, 2007
TEST LABORATORY: GENERAL TESTING LABORATORIES
OBSERVERS: GRANT FARRAND, JIMMY LATANE

WINDSHIELD AREA: 1851 in^2 AREA C = 248.0 in^2 AREA D = 248.0 in^2 AREA A= 1060 in^2

MANUFACTURER'S WINDSHIELD PATTERN USED: Yes X No

ENGINE THERMOSTAT NOMINAL REGULATING TEMPERATURE: 185 ºF

HEATER-DEFROSTER SYSTEM INCLUDES AIR CONDITIONER: YES X NO

DESCRIBE UNUSUAL FEATURES OF DEFROSTING SYSTEM: Recommended best defrost fan speed is speed 3, not speed 4.

DESCRIBE UNUSUAL FEATURES OF TEST CAR: NONE

DESIGNATION	AREA PERCENT DEFROSTED					
	TEST 1	TEST 2	AVG	REQ'D	PASS	FAIL
CRITICAL AREA C AT 20 MINUTES	100%	100%	100%	80% MINIMUM	PASS	
PASSENGER AREA D AT 25 MINUTES	100%	100%	100%	80% MINIMUM	PASS	
TOTAL AREA A AT 40 MINUTES	100%	100%	100%	95% MINIMUM	PASS	

REMARKS:

RECORDED BY: G. FARRAND DATE: 10/18/07

APPROVED BY: D. MESSICK

FMVSS 103 TEST DATA RECORD – TEST RUN NO. 1

VEH. MOD YR/MAKE/MODEL/BODY: 2007 VOLKSWAGEN RABBIT PASSENGER CAR
VEH. NHTSA NO: C75800; VIN: WVWCR71K67W131176
VEH. BUILD DATE: 12/06; TEST DATE: OCTOBER 17-18, 2007
TEST LABORATORY: GENERAL TESTING LABORATORIES
OBSERVERS: GRANT FARRAND, JIMMY LATANE

If 1st Test Run, chamber conditioned 19 hours @ 0º ±5º F (14 hrs. min.)

Cold Soak Period: 19 HOURS

Time engine coolant and lubricant remained stabilized at 0º F: 14 hrs. 0 minutes

Water Spray Gun and Nozzle Type: BINKS #66 S

Spray Gun Pressure: 50 psi (50 psi ± 3 psi)

Water used: 18.5 fluid oz. (0.010 ounces per square inch of windshield area)

Soak Period Between Ice Application and Test Start: 35 minutes (30 to 40 minutes)

Engine Speed: 4000 rpm (first 5 minutes, then 1500-1600) (Target engine speed 1500 to 1600 rpm)

Wind at specified location in front of windshield: 1 mph (0 to 2 mph)

Number of Vehicle Occupants: 1 (2 maximum)

Describe window openings, if any: NONE

TIME FROM START (minutes)	MOTOR VOLTAGE (volts)	TEMPERATURE, ºF					DEFROSTED AREA, %		
		TEST ROOM	ENGINE WATER	HEATER WATER IN	DEFROSTER AIR				
					DRVR	PSGR	A	C	D
0	13.5	-3.9	-.2	-3.2*	-3.3	-2.5	0%	0%	0%
5	14.7	.5	79.6	123.9*	122.7	131.5	18.8%	7.7%	18.4%
10	14.6	3.0	122.6	135.7*	136.8	141.1	90.3%	99.7%	97.9%
15	14.6	4.0	144.8	148.5*	148.0	152.1	100%	100%	100%
20	14.5	4.5	154.6	155.5*	151.7	155.6	100%	100%	100%

REMARKS: * Heater Water In Thermocouple is located on outside of heater hose.

RECORDED BY: G. FARRAND DATE: 10/17/07

APPROVED BY: D. MESSICK

FMVSS 103 TEST DATA RECORD – TEST RUN NO. 2

VEH. MOD YR/MAKE/MODEL/BODY: 2007 VOLKSWAGEN RABBIT PASSENGER CAR
VEH. NHTSA NO: C75800; VIN: WVWCR71K67W131176
VEH. BUILD DATE: 12/06 ; TEST DATE: OCTOBER 17-18, 2007
TEST LABORATORY: GENERAL TESTING LABORATORIES
OBSERVERS: GRANT FARRAND, JIMMY LATANE

If 1st Test Run, chamber conditioned N/A hours @ 0º ±5º F (14 hrs. min.)

Cold Soak Period: 15.0 HOURS

Time engine coolant and lubricant remained stabilized at 0º F: 11 hrs. ____ minutes

Water Spray Gun and Nozzle Type: BINKS #66S

Spray Gun Pressure: 50 psi (50 psi ± 3 psi)

Water used: 18.5 fluid oz. (0.010 ounces per square inch of windshield area)

Soak Period Between Ice Application and Test Start: 35 minutes (30 to 40 minutes)

Engine Speed: 4000 rpm (first 5 minutes, then 1500-1600) (Target engine speed 1500 to 1600 rpm)

Wind at specified location in front of windshield: 1 mph (0 to 2 mph)

Number of Vehicle Occupants: 1 (2 maximum)

Describe window openings, if any: NONE

TIME FROM START (minutes)	MOTOR VOLTAGE (volts)	TEMPERATURE, ºF					DEFROSTED AREA, %		
		TEST ROOM	ENGINE WATER	HEATER WATER IN	DEFROSTER AIR				
					DRVR	PSGR	A	C	D
0	13.5	-1.8	-1.6	-1.7*	-.7	-.6	0%	0%	0%
5	14.7	1.6	64.9	72.3*	120.3	125.3	17.3%	13.2%	15.6%
10	14.6	1.5	118.5	121.6*	132.4	136.8	87.9%	99.8%	96.2%
15	14.6	3.9	141.3	143.9*	142.6	146.8	100%	100%	100%
20	14.5	5.0	153.2	155.0*	149.7	153.7	100%	100%	100%

REMARKS: * Heater Water In Thermocouple is located on outside of heater hose.

RECORDED BY: G. FARRAND DATE: 10/18/07

APPROVED BY: D. MESSICK

SECTION 4
INSTRUMENTATION AND EQUIPMENT LIST

TABLE 1 - INSTRUMENTATION & EQUIPMENT LIST

EQUIPMENT	DESCRIPTION	MODEL/ SERIAL NO.	CAL. DATE	NEXT CAL. DATE
TIMER	ACCU-SPLIT	ACT1	10/07	10/08
TAC/RECORDER	MONARCH	1444664	08/07	08/08
TEMPERATURE RECORDER	OMEGA	B/55662	06/07	06/08
SPRAY GUN	BINKS	66S	BEFORE USE	BEFORE USE
ANEMOMETER	OMEGA	53668	06/07	06/08
AIR PRESSURE GAGE	BINKS	0-160	10/07	10/08
SCALE	METTLER	H315/ 445951	BEFORE USE	BEFORE USE
GRADUATED BEAKER	PHOTAX	N/A	N/A	N/A
EVENT RECORDER	COMPUTER	GEO1	BEFORE USE	BEFORE USE

SECTION 5

PHOTOGRAPHS

2007 VOLKSWAGEN RABBIT
NHTSA NO. C75800
FMVSS NO. 103

FIGURE 5.1
LEFT SIDE VIEW OF VEHICLE

2007 VOLKSWAGEN RABBIT
NHTSA NO. C75800
FMVSS NO. 103

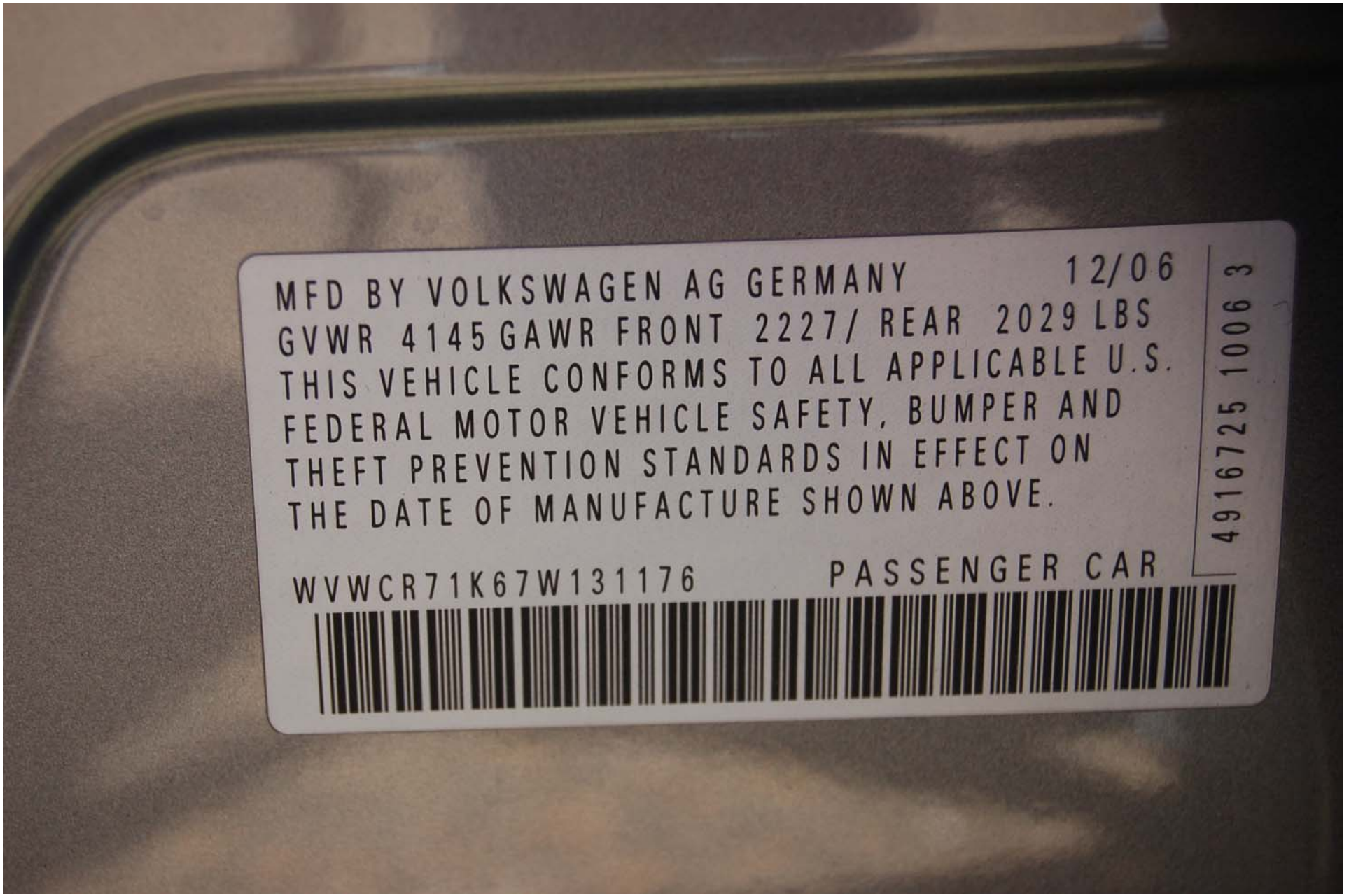
FIGURE 5.2
RIGHT SIDE VIEW OF VEHICLE

2007 VOLKSWAGEN RABBIT
NHTSA NO. C75800
FMVSS NO. 103

FIGURE 5.3
¾ FRONTAL VIEW FROM LEFT SIDE OF VEHICLE

2007 VOLKSWAGEN RABBIT
NHTSA NO. C75800
FMVSS NO. 103

FIGURE 5.4
¾ REAR VIEW FROM RIGHT SIDE VIEW OF VEHICLE



2007 VOLKSWAGEN RABBIT
NHTSA NO. C75800
FMVSS NO. 103

FIGURE 5.5
VEHICLE CERTIFICATION LABEL

2007 VOLKSWAGEN RABBIT
NHTSA NO. C75800
FMVSS NO. 103

FIGURE 5.6
VEHICLE TIRE INFORMATION LABEL

2007 VOLKSWAGEN RABBIT
NHTSA NO. C75800
FMVSS NO. 103

FIGURE 5.7
CLOSE-UP VIEW OF DEFROSTER CONTROL SETTING
ON DASH

2007 VOLKSWAGEN RABBIT
NHTSA NO. C75800
FMVSS NO. 103

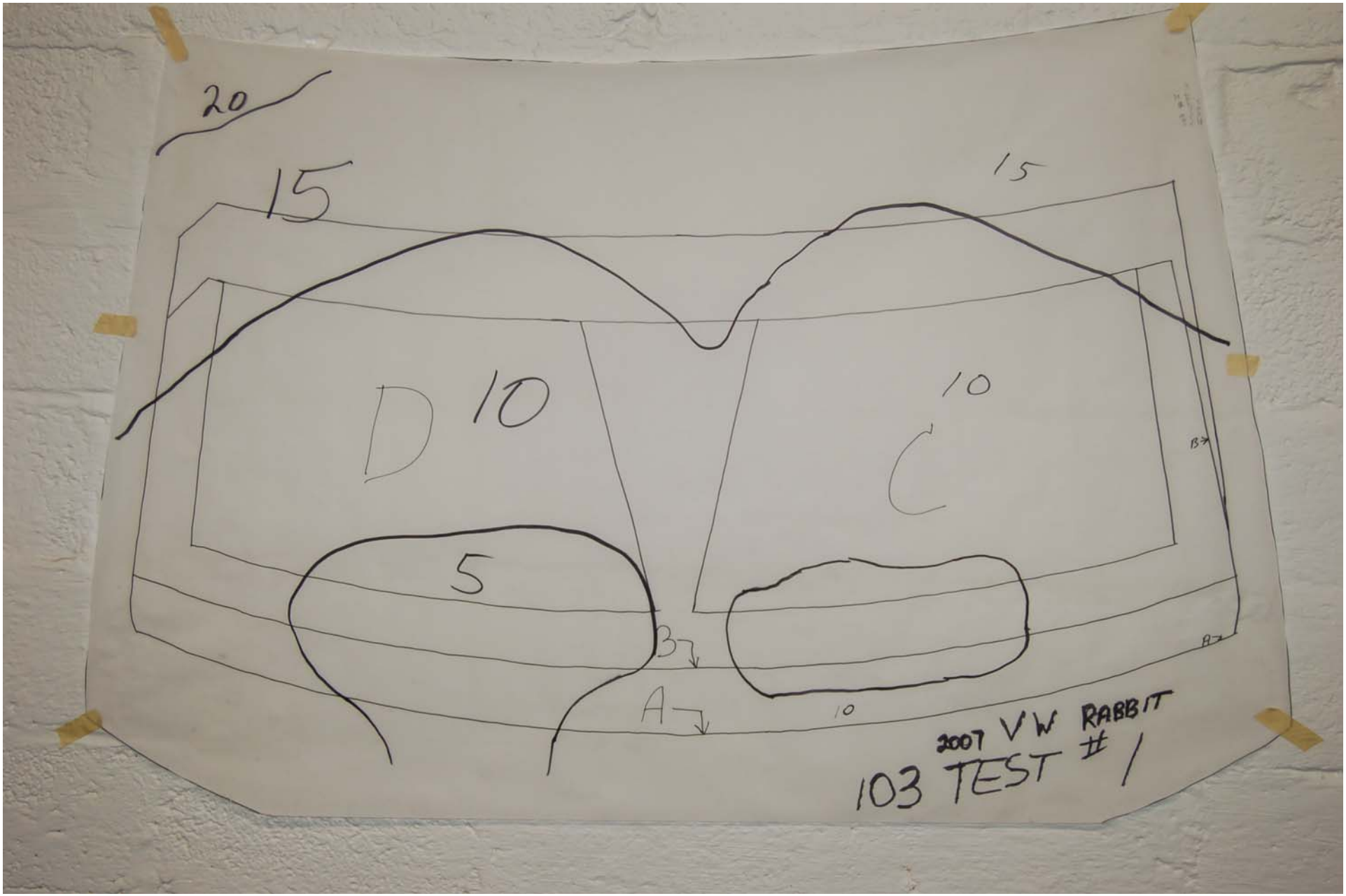
FIGURE 5.8
INSTRUMENTATION SET-UP

2007 VOLKSWAGEN RABBIT
NHTSA NO. C75800
FMVSS NO. 103

FIGURE 5.9
WINDSHIELD, PRE-TEST FROSTED STATE TEST #1

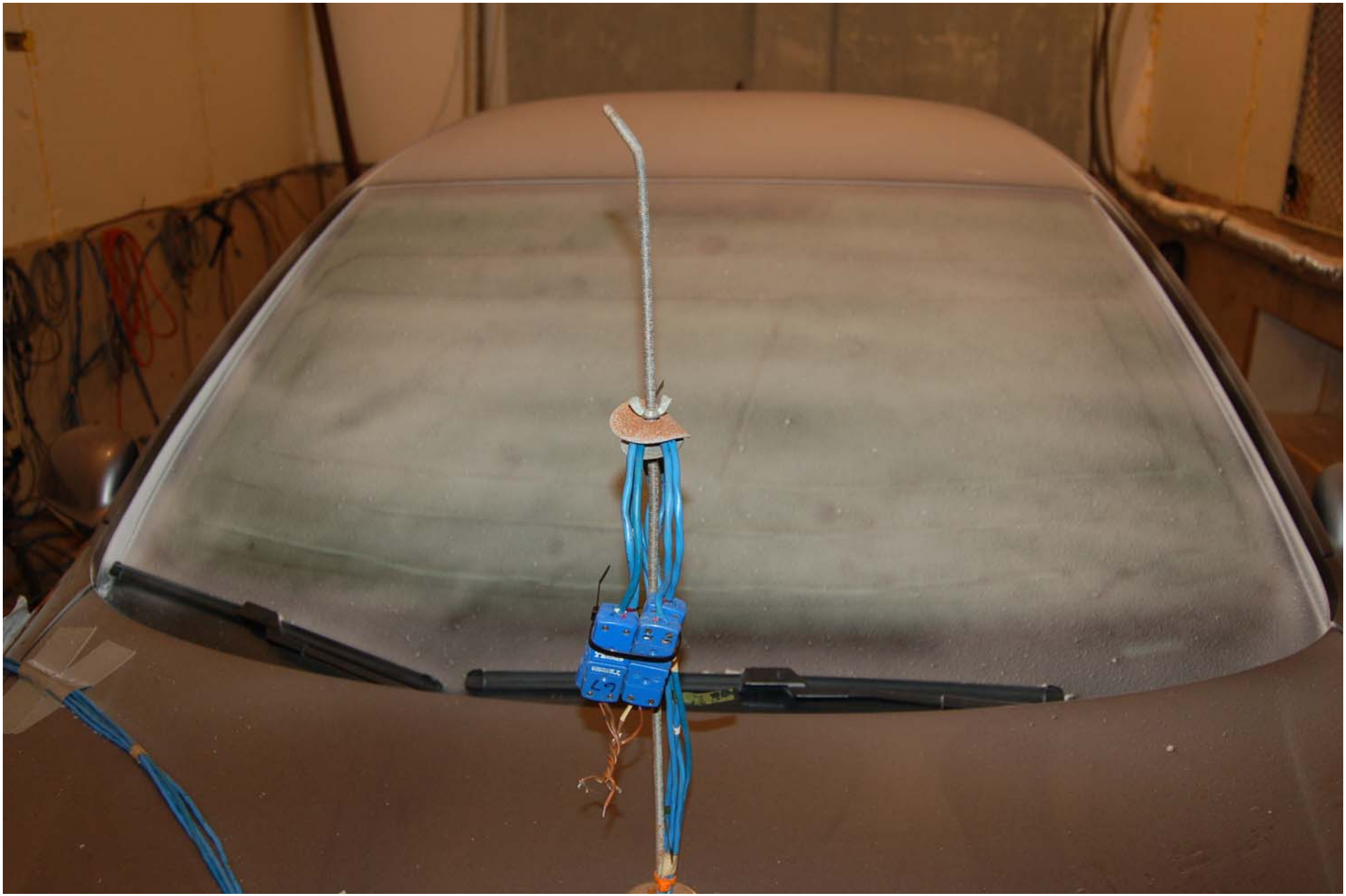
2007 VOLKSWAGEN RABBIT
NHTSA NO. C75800
FMVSS NO. 103

FIGURE 5.10
DEFROSTED AREA AT 20 MINUTES TEST #1



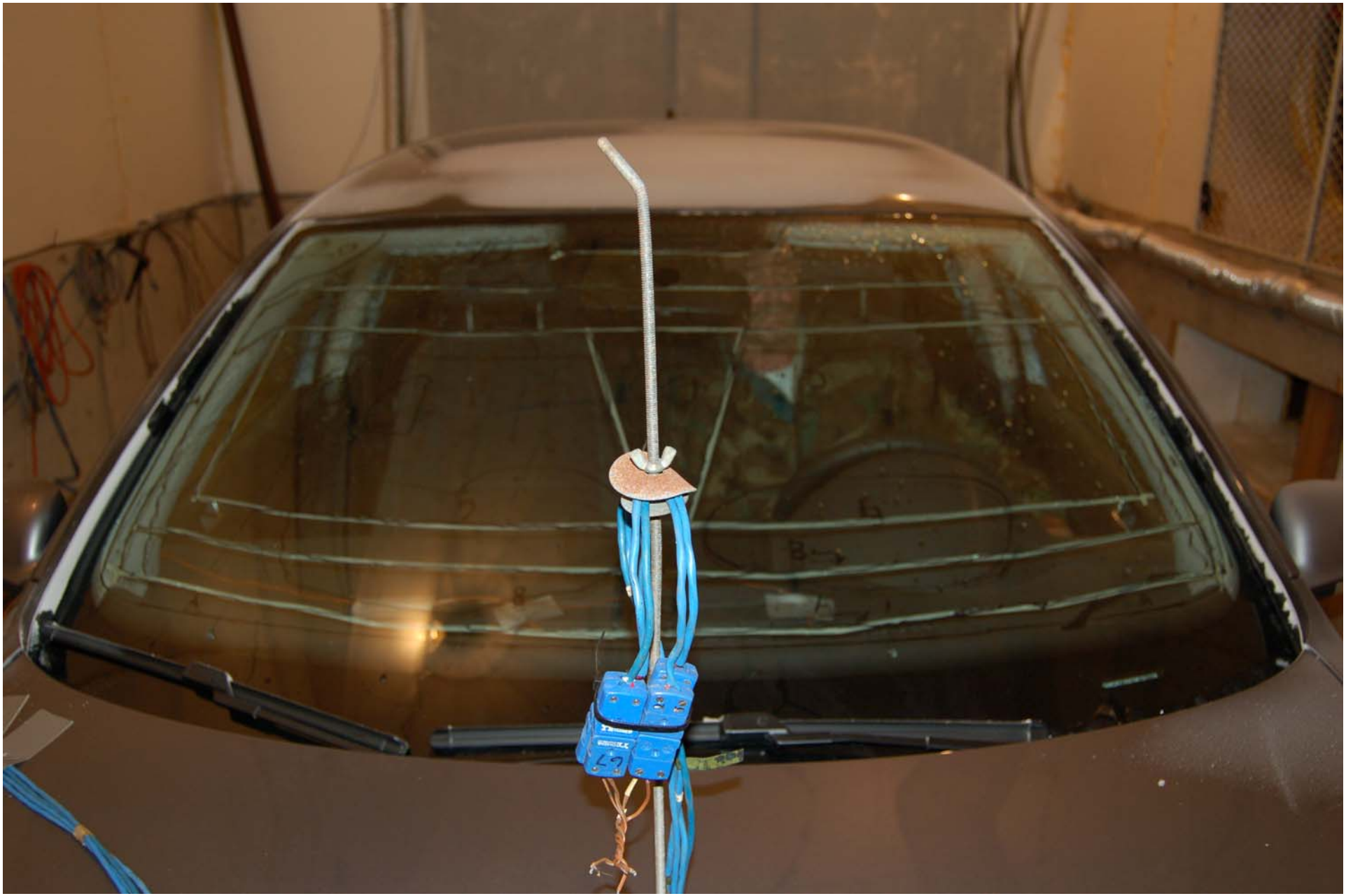
2007 VOLKSWAGEN RABBIT
NHTSA NO. C75800
FMVSS NO. 103

FIGURE 5.11
WINDSHIELD VELLUM PATTERN, POST TEST #1



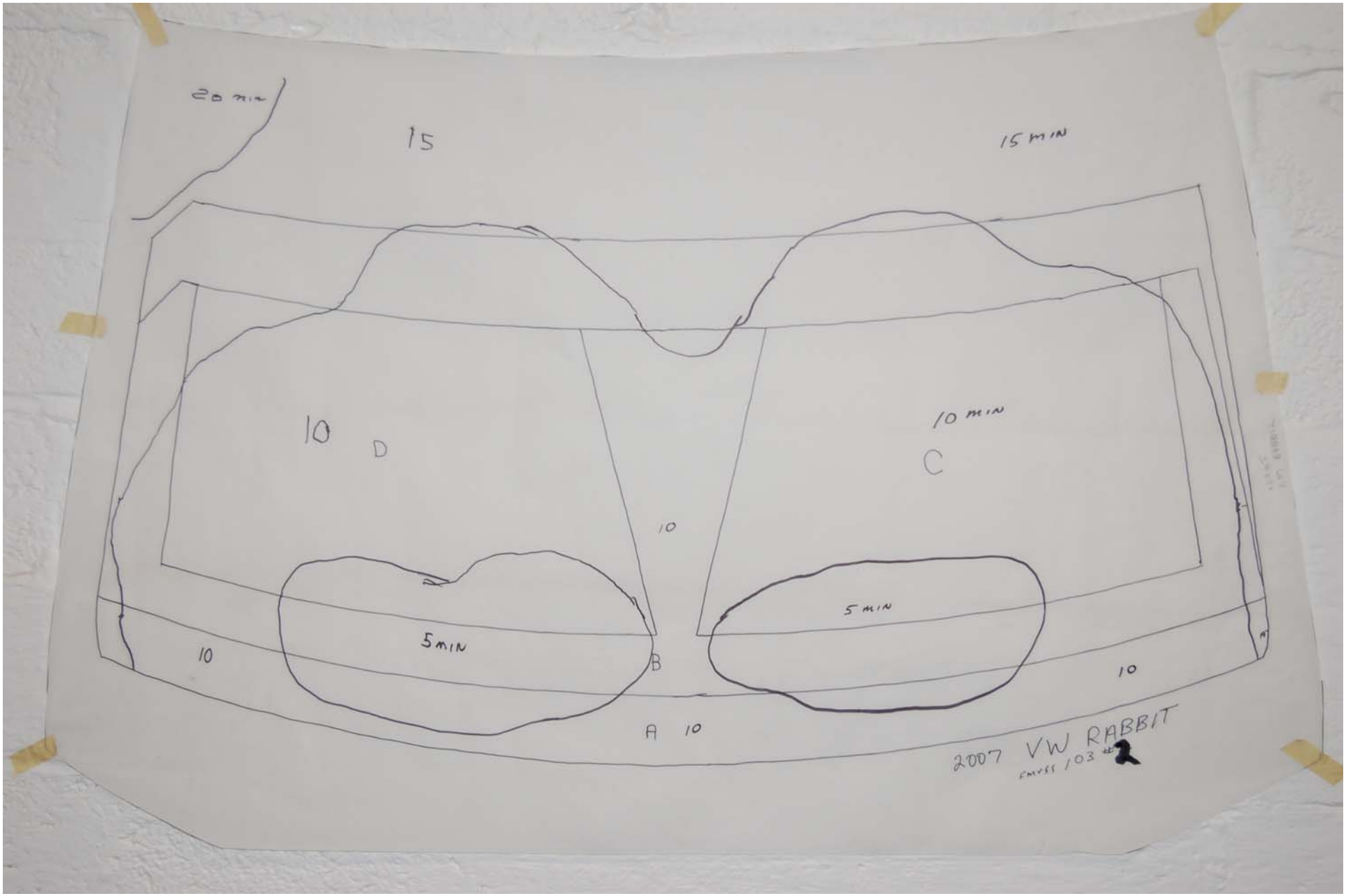
2007 VOLKSWAGEN RABBIT
NHTSA NO. C75800
FMVSS NO. 103

FIGURE 5.12
WINDSHIELD PRE-TEST FROSTED STATE TEST #2



2007 VOLKSWAGEN RABBIT
NHTSA NO. C75800
FMVSS NO. 103

FIGURE 5.13
DEFROSTED AREA AT 20 MINUTES TEST #2



2007 VOLKSWAGEN RABBIT
NHTSA NO. C75800
FMVSS NO. 103

FIGURE 5.14
WINDSHIELD VELLUM PATTERN, POST TEST #2

SECTION 6

OWNER'S MANUAL DEFROSTER INSTRUCTIONS

Air conditioning

Climatic

Controls

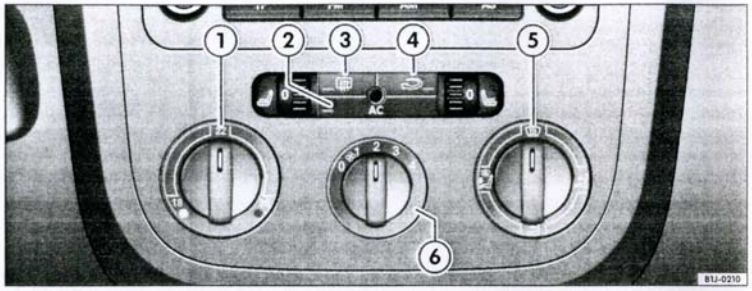


Fig. 66 Climatic air conditioning controls in the center console.

The air conditioning system (compressor) only works when the engine is running and the fan is switched on.

– Use controls ①, ⑤ and ⑥ in the center console to set and adjust temperature, air distribution and fan speed ⇒ fig. 66.

– Press the appropriate button ②, ③ or ④ to switch the air conditioning, rear window defogger and air recirculation mode on or off. When switched on, a light in the button comes on.

① Temperature setting ⇒ page 68.

② The AC button – switches the air-conditioning (compressor) on. When the button indicator light comes on, the air-conditioning is on.

③ button – Rear window defogger. It is switched off automatically about *10 minutes* after you switch it on. It can also be switched off by pushing the button again.

④ button – Air recirculation mode ⇒ page 70.

⑤ Air distribution control – Use it to direct the air flow where you want it ⇒ page 68.
- – Directs air toward the windshield (defrost). With this setting, the recirculation function is switched off for safety reasons. It can be switched back on again by pressing the button.
- – Directs air to the upper instrument panel outlets.
- – Directs air to the footwells.
- – Directs air toward the windshield and the footwells.

⑥ Fan – The fan has four speeds. The fan should always be set to the lowest speed "1" when driving slowly, and if outside air quality permits.

⚠ WARNING

Poor visibility increases the risk of collisions and other accidents that cause serious personal injuries.

- **Always make sure all windows are clear of ice, snow and condensation for good visibility through the windshield, side and rear windows.**

⚠ WARNING (continued)

- Maximum heating output and fast defrosting will only be possible after the engine has reached operating temperature. Wait until you have good visibility before driving off.
- Always make sure you know how to properly use the heating and ventilation systems as well as the rear window defogger that you will need for good visibility.
- Never use air recirculation for long periods of time because no fresh air will come into the passenger compartment. When the air conditioning is off and recirculation mode is on, condensation can quickly form on the windows and greatly reduce visibility.
- Always switch off recirculation mode when it is not needed.

⚠ WARNING (continued)

- Always read and heed the information and all WARNINGS ⇒ page 71, "Important notes".

⚠ WARNING

Stale air causes driver fatigue and reduces driver alertness, which can cause accidents, collisions and serious personal injuries.

- Never use air recirculation for long periods of time because no fresh air will come into the passenger compartment.

i Tips

The arrangement of controls may vary depending on equipment and options on your vehicle. The symbols and labels on the buttons are the same. ◀

Heating and cooling the interior

Climatic controls air temperature so that the selected temperature is reached as quickly as possible and then kept constant.

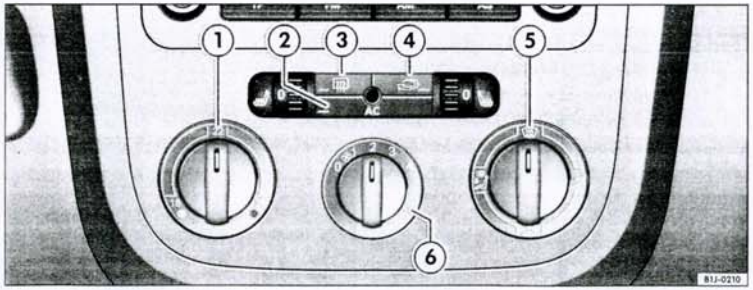


Fig. 67 Climatic air conditioning controls in the center console.

Heating the interior

– Turn off the air-conditioning by pressing the AC button ②. The indicator light on the button goes out ⇒ fig. 67.

– Turn the temperature selector ① to the right until you reach the desired temperature setting ⇒ fig. 67. We recommend 72° F (22° C).

– Turn the fan switch ⑥ to one of the fan speed settings (1-4).

– Use the air distribution control ⑤ to direct the air flow where you want it: (to the windshield), (to the upper instrument panel outlets), (to the footwells) or (to the windshield and the footwells) ⇒ page 70, "Air recirculation mode". ▶

Cooling the interior

– Turn on the air-conditioning by pressing the AC button ②. The button indicator light *must* come on.

– Turn the temperature selector ① to the left until you reach the desired temperature setting.

– Turn the fan switch ⑥ to one of the fan speed settings (1-4).

– Use the air distribution control ⑤ to direct the air flow where you want it: (to the windshield), (to the upper instrument panel outlets), (to the footwells) or (to the windshield and the footwells).

Switching off the Climatic

– Turn the fan speed control ⑥ to 0 to switch off the Climatic. Some outside air may still flow into the vehicle while you are driving.

Heating

Maximum heat output, to defrost the windows most quickly, is only available when the engine has reached its normal operating temperature.

Cooling

When the air conditioning is on, not only the temperature, but also the humidity in the vehicle interior is reduced. This improves comfort for the vehicle occupants and keeps the windows from fogging up when the outside air is very humid.

If the air conditioning does not come on, it could be for one of the following reasons:

- The engine is not running.
- The fan is switched off.
- Outside temperature is lower than about +40° F (+3° C).
- The air conditioning compressor has been temporarily switched off because the engine coolant temperature is too high.
- The air conditioning fuse is blown.

If the air conditioning still does not work after these checks, have the system checked by an authorized Volkswagen dealer or a qualified workshop.

⚠ WARNING

Poor visibility increases the risk of collisions and other accidents that cause serious personal injuries.

- Always make sure all windows are clear of ice, snow and condensation for good visibility through the windshield, side and rear windows.
- Maximum heating output and fast defrosting will only be possible after the engine has reached operating temperature. Wait until you have good visibility before driving off.
- Always make sure you know how to properly use the heating and ventilation systems as well as the rear window defogger that you will need for good visibility.
- Never use air recirculation for long periods of time because no fresh air will come into the passenger compartment. When the air conditioning is off and recirculation mode is on, condensation can quickly form on the windows and greatly reduce visibility.
- Always switch off recirculation mode when it is not needed.
- Always read and heed the information and all WARNINGS ⇒ page 71, "Important notes".

⚠ WARNING

Stale air causes driver fatigue and reduces driver alertness, which can cause accidents, collisions and serious personal injuries.

- Never use air recirculation for long periods of time because no fresh air will come into the passenger compartment. ◀

Air recirculation mode

Air recirculation mode helps keep fumes or unpleasant smells from entering the vehicle.

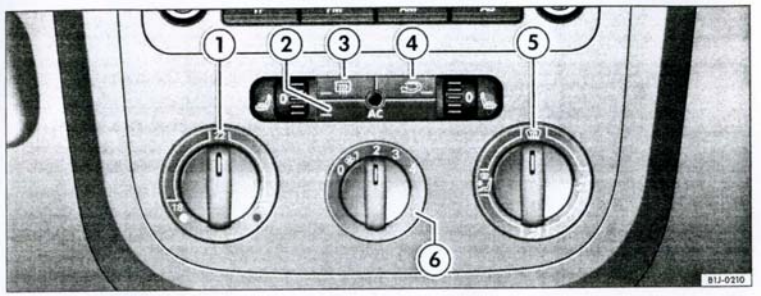


Fig. 68 Climatic controls in the center console.

– Press the ⟲ button to switch the air recirculation mode on or off ⇒ fig. 68. When it is switched on, a yellow indicator light in the button comes on.

Air recirculation mode helps keep strong outside odors from getting into the vehicle, such as when driving through a tunnel or in heavy traffic.

When the outside temperature is very low, using the air recirculation mode for a short time will provide more effective heating by heating warmer air from inside the vehicle instead of cold air from outside.

When the outside temperature is very high, using the air recirculation mode for a short time will provide more effective cooling by cooling the air from inside the vehicle instead of warm air from outside.

For safety reasons, air recirculation is switched off when the air distribution control is set to the ⌯ position. The air recirculation mode can be switched back on by pressing the ⟲ button again.

If you shift into Reverse while the windshield wipers are working, Climatic will temporarily switch on the air recirculation mode. This keeps outside air (exhaust fumes from other vehicles) from entering the vehicle.

⚠ WARNING

Poor visibility increases the risk of collisions and other accidents that cause serious personal injuries.

- **Always make sure all windows are clear of ice, snow and condensation for good visibility through the windshield, side and rear windows.**
- **Maximum heating output and fast defrosting will only be possible after the engine has reached operating temperature. Wait until you have good visibility before driving off.**
- **Always make sure you know how to properly use the heating and ventilation systems as well as the rear window defogger that you will need for good visibility.**
- **Never use air recirculation for long periods of time because no fresh air will come into the passenger compartment. When the air conditioning is off and recirculation mode is on, condensation can quickly form on the windows and greatly reduce visibility.**
- **Always switch off recirculation mode when it is not needed.**
- **Always read and heed the information and all WARNINGS ⇒ page 71, "Important notes".** ▶