

REPORT NUMBER 103-GTL-09-004

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

**GENERAL MOTORS CORP.  
2009 CADILLAC CTS, PASSENGER CAR  
NHTSA NO. C90101**

**GENERAL TESTING LABORATORIES, INC.  
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COLONIAL BEACH, VIRGINIA 22443**



JUNE 30, 2009

FINAL REPORT

PREPARED FOR

**U. S. DEPARTMENT OF TRANSPORTATION  
NATIONAL HIGHWAY TRAFFIC SAFETY ADMINISTRATION  
ENFORCEMENT  
OFFICE OF VEHICLE SAFETY COMPLIANCE  
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## SECTION 1

## PURPOSE OF COMPLIANCE TEST

1.0 PURPOSE OF COMPLIANCE TEST

A 2009 CADILLAC CTS 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, Multipurpose Vehicles, Trucks and Buses".

1.1 TEST VEHICLE

The test vehicle was a 2009 CADILLAC CTS Passenger Car. Nomenclature applicable to the test vehicle are:

A. Vehicle Identification Number: 1G6DG577790130497

B. NHTSA No.: C90101

C. Manufacturer: GENERAL MOTORS CORP.

D. Manufacture Date: 08/08

E. Color: Gold Mist

1.2 TEST DATE

The test vehicle was subjected to FMVSS No. 103 testing on June 10-12, 2009.

## SECTION 2

### COMPLIANCE TEST PROCEDURE AND SUMMARY OF RESULTS

#### 2.0 GENERAL

The 2009 CADILLAC CTS 4-door passenger car, NHTSA No. C90101 was subjected to FMVSS No. 103 tests on June 10-12, 2009. 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 5.16 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,  $0^{\circ} \pm 5^{\circ}$  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  $0^{\circ} \pm 5^{\circ}$  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 2009 CADILLAC CTS.



SUMMARY DATA SHEET  
FMVSS 103, WINDSHIELD DEFROSTING AND DEFOGGING SYSTEMS

VEH. MOD YR/MAKE/MODEL/BODY: 2009 CADILLAC CTS PASSENGER CAR  
 VEH. NHTSA NO: C90101; VIN: 1G6DG577790130497  
 VEH. BUILD DATE: 08/08 TEST DATE: JUNE 10-12, 2009  
 TEST LABORATORY: GENERAL TESTING LABORATORIES  
 OBSERVERS: GRANT FARRAND, JIMMY LATANE

WINDSHIELD AREA: 1377 in<sup>2</sup> AREA C = 259 in<sup>2</sup> AREA D = 259 in<sup>2</sup> AREA A = 1115 in<sup>2</sup>

MANUFACTURER'S WINDSHIELD PATTERN USED: Yes X No \_\_\_\_\_

ENGINE THERMOSTAT NOMINAL REGULATING TEMPERATURE: 180 °F

HEATER-DEFROSTER SYSTEM INCLUDES AIR CONDITIONER: YES X NO \_\_\_\_\_

DESCRIBE UNUSUAL FEATURES OF DEFROSTING SYSTEM: None

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: 06/12/09

APPROVED BY: D. MESSICK

FMVSS 103 TEST DATA RECORD – TEST RUN NO. 1

VEH. MOD YR/MAKE/MODEL/BODY: 2009 CADILLAC CTS PASSENGER CAR  
 VEH. NHTSA NO: C90101; VIN: 1G6DG577790130497  
 VEH. BUILD DATE: 08/08; TEST DATE: JUNE 11, 2009  
 TEST LABORATORY: GENERAL TESTING LABORATORIES  
 OBSERVERS: GRANT FARRAND, JIMMY LATANE

If 1<sup>st</sup> Test Run, chamber conditioned 24 hours @ 0° ±5° F (14 hrs. min.)

Cold Soak Period: 24 HOURS

Time engine coolant and lubricant remained stabilized at 0° F: 9 hrs.     minutes

Water Spray Gun and Nozzle Type: BINKS #66S

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

Water used: 13.8 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: 1500 rpm (Target engine speed 1500 to 1600 rpm)

Wind at specified location in front of windshield: .2 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, °F					DEFROSTED AREA, %		
		TEST ROOM	ENGINE WATER	HEATER WATER IN	DEFROSTER AIR		A	C	D
					DRVR	PSGR			
0	13.5	-3.6	-2.5	-2.7*	-2.5	-2.4	0%	0%	0%
5	14.5	-3.1	8.8	9.8*	49.3	53.3	0%	0%	0%
10	14.5	-1.5	58.5	60.3*	84.3	92.7	54.5%	57.4%	54.5%
15	14.5	.9	85.4	98.5*	102.3	112.2	97.9%	100%	98.7%
20	14.5	3.1	98.3	113.1*	112.4	123.5	100%	100%	100%

REMARKS: \*Heater Water In thermocouple is located on outside of heater hose connectors.

RECORDED BY: G. FARRAND

DATE: 06/11/09

APPROVED BY: D. MESSICK

FMVSS 103 TEST DATA RECORD – TEST RUN NO. 2

VEH. MOD YR/MAKE/MODEL/BODY: 2009 CADILLAC CTS PASSENGER CAR  
 VEH. NHTSA NO: C90101; VIN: 1G6DG577790130497  
 VEH. BUILD DATE: 08/08; TEST DATE: JUNE 12, 2009  
 TEST LABORATORY: GENERAL TESTING LABORATORIES  
 OBSERVERS: GRANT FARRAND, JIMMY LATANE

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

Cold Soak Period: 24.0 HOURS

Time engine coolant and lubricant remained stabilized at 0° F: 8 hrs. 45 minutes

Water Spray Gun and Nozzle Type: BINKS #66S

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

Water used: 13.8 fluid oz. (0.010 ounces per square inch of windshield area)

Soak Period Between Ice Application and Test Start: 36 minutes (30 to 40 minutes)

Engine Speed: 1500 rpm (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, °F					DEFROSTED AREA, %		
		TEST ROOM	ENGINE WATER	HEATER WATER IN	DEFROSTER AIR		A	C	D
					DRVR	PSGR			
0	13.5	-4.5	-2.7	-2.8*	-2.9	-2.8	0%	0%	0%
5	14.5	-3.2	16.2	35.1*	56.8	62.7	1.9%	0%	0%
10	14.5	-1.8	61.6	74.2*	86.4	94.9	57.6%	59.6%	59.6%
15	14.5	0.4	83.6	96.8*	101.1	110.8	99.5%	100%	100%
20	14.5	3.6	100.1	115.0*	116.3	127.6	100%	100%	100%

REMARKS: \*Heater Water In thermocouple is located on outside of heater hose connectors.

RECORDED BY: G. FARRAND

DATE: 06/12/09

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	05/09	05/10
TAC/RECORDER	MONARCH	1444664	05/09	05/10
TEMPERATURE RECORDER	FLUKE	7471026	08/08	10/09
SPRAY GUN	BINKS	66S	BEFORE USE	BEFORE USE
ANEMOMETER	OMEGA	HH-600	05/09	05/10
AIR PRESSURE GAGE	BINKS	0-160	05/09	05/10
SCALE	METTLER	H315/ 445951	05/09	05/10
GRADUATED BEAKER	PHOTAX	N/A	N/A	N/A
EVENT RECORDER	COMPUTER	GEO1	BEFORE USE	BEFORE USE

SECTION 5  
PHOTOGRAPHS



2009 CADILLAC CTS  
NHTSA NO. C90101  
FMVSS NO. 103

FIGURE 5.1  
LEFT SIDE VIEW OF VEHICLE



2009 CADILLAC CTS  
NHTSA NO. C90101  
FMVSS NO. 103

FIGURE 5.2  
RIGHT SIDE VIEW OF VEHICLE



2009 CADILLAC CTS  
NHTSA NO. C90101  
FMVSS NO. 103

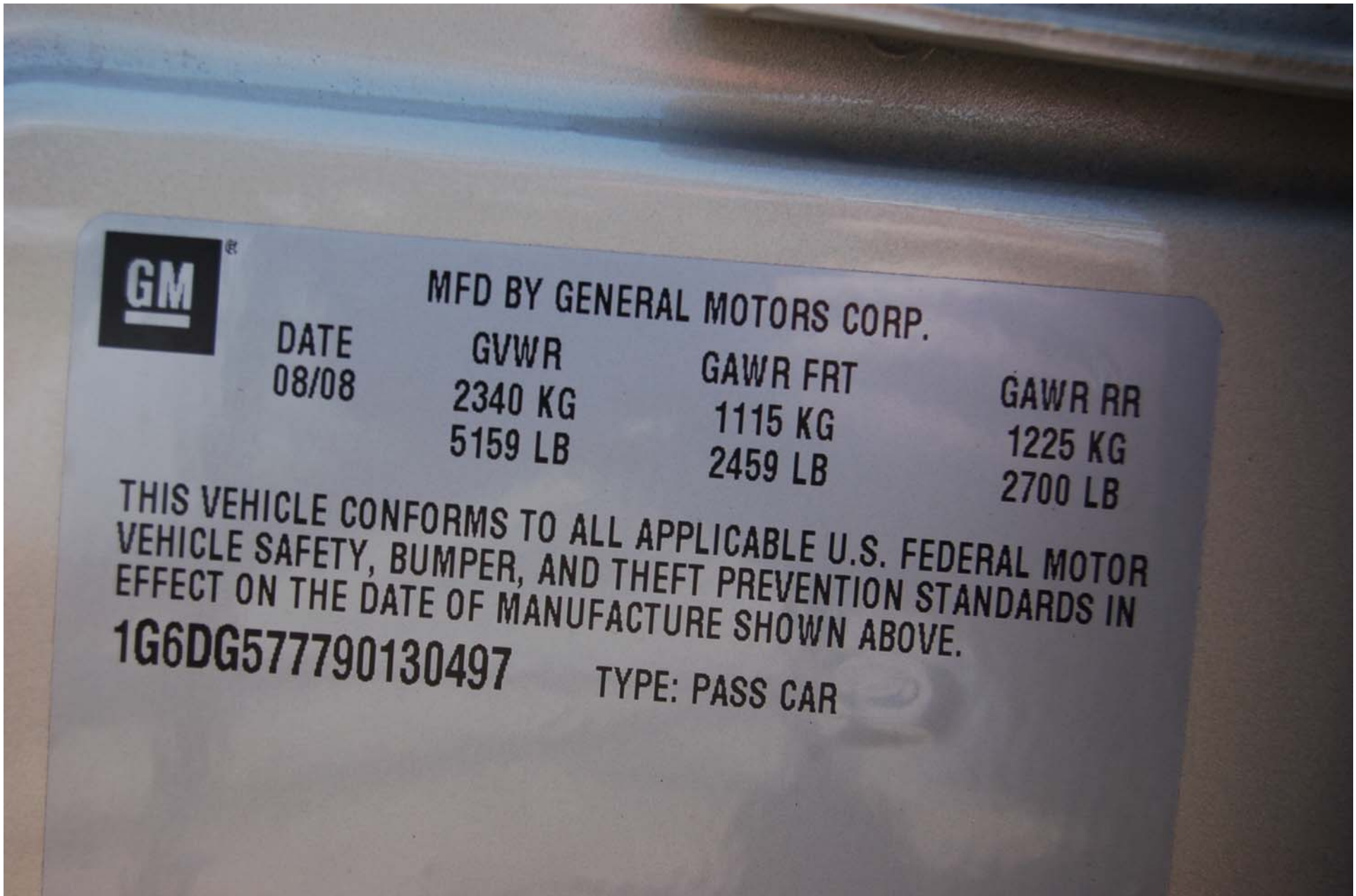
FIGURE 5.3  
¾ FRONTAL VIEW FROM LEFT SIDE OF VEHICLE





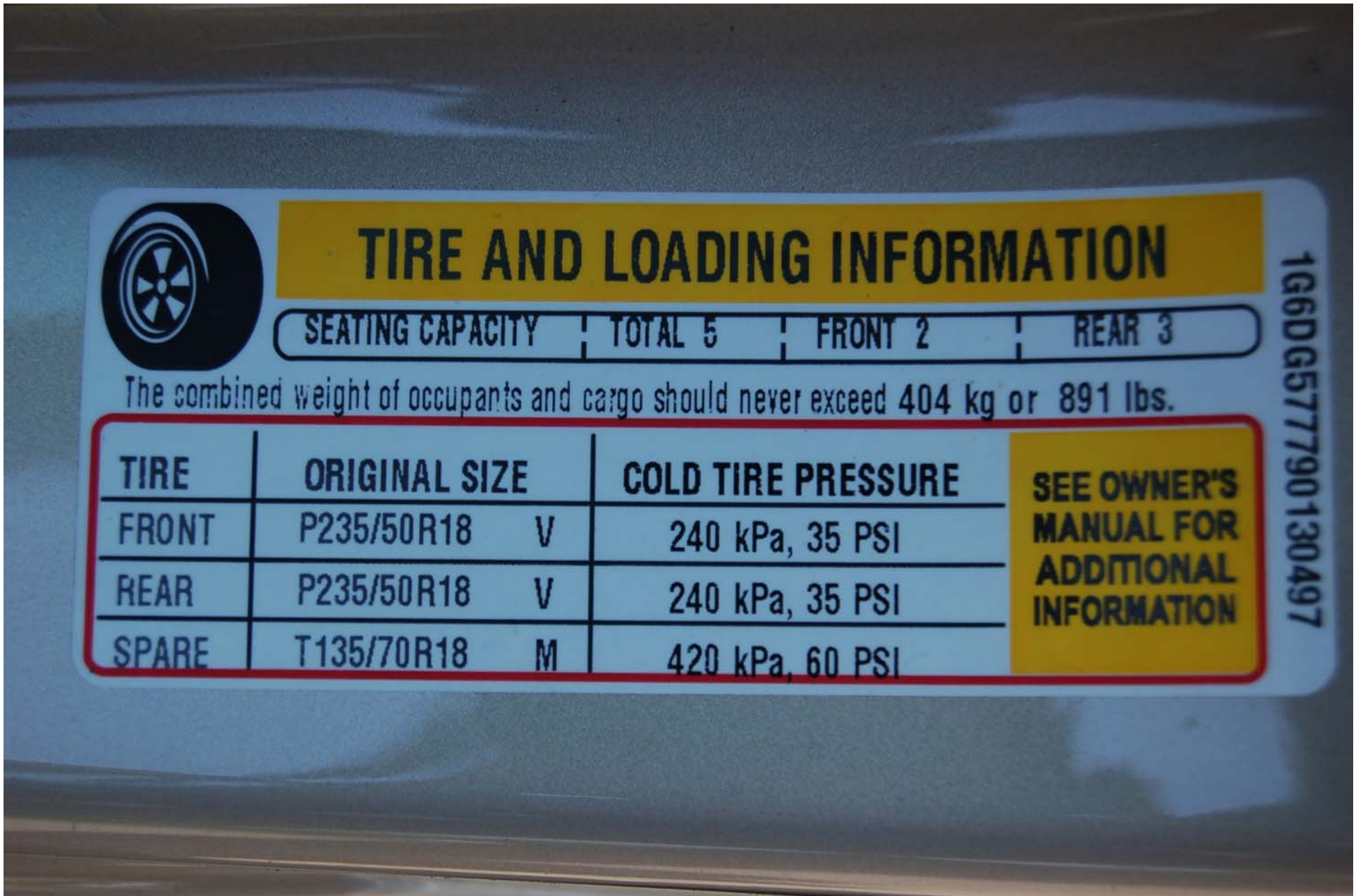
2009 CADILLAC CTS  
NHTSA NO. C90101  
FMVSS NO. 103

FIGURE 5.4  
¾ REAR VIEW FROM RIGHT SIDE OF VEHICLE



2009 CADILLAC CTS  
NHTSA NO. C90101  
FMVSS NO. 103

FIGURE 5.5  
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 404 kg or 891 lbs.

TIRE	ORIGINAL SIZE		COLD TIRE PRESSURE
FRONT	P235/50R18	V	240 kPa, 35 PSI
REAR	P235/50R18	V	240 kPa, 35 PSI
SPARE	T135/70R18	M	420 kPa, 60 PSI

**SEE OWNER'S  
MANUAL FOR  
ADDITIONAL  
INFORMATION**

1G6DG577790130497

2009 CADILLAC CTS  
NHTSA NO. C90101  
FMVSS NO. 103

FIGURE 5.6  
VEHICLE TIRE INFORMATION LABEL



2009 CADILLAC CTS  
NHTSA NO. C90101  
FMVSS NO. 103

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



2009 CADILLAC CTS  
NHTSA NO. C90101  
FMVSS NO. 103

FIGURE 5.8  
INSTRUMENTATION SET-UP



2009 CADILLAC CTS  
NHTSA NO. C90101  
FMVSS NO. 103

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



2009 CADILLAC CTS  
NHTSA NO. C90101  
FMVSS NO. 103

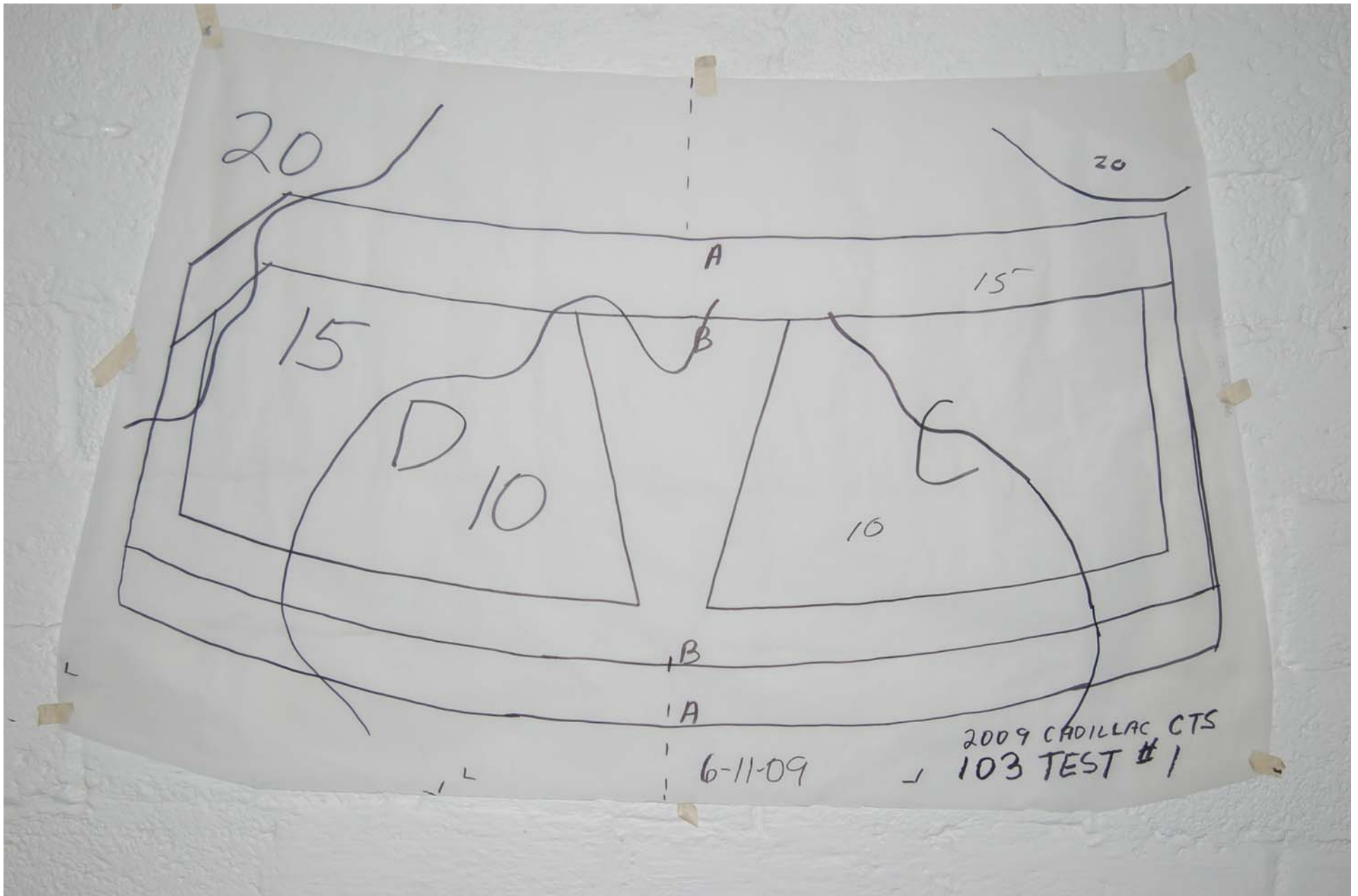
FIGURE 5.10  
DEFROSTED AREA AT 15 MINUTES TEST #1



2009 CADILLAC CTS  
NHTSA NO. C90101  
FMVSS NO. 103

FIGURE 5.11  
DEFROSTED AREA AT 20 MINUTES TEST #1





2009 CADILLAC CTS  
NHTSA NO. C90101  
FMVSS NO. 103

FIGURE 5.12  
WINDSHIELD VELLUM PATTERN, POST TEST #1



2009 CADILLAC CTS  
NHTSA NO. C90101  
FMVSS NO. 103

FIGURE 5.13  
WINDSHIELD PRE-TEST FROSTED STATE #2



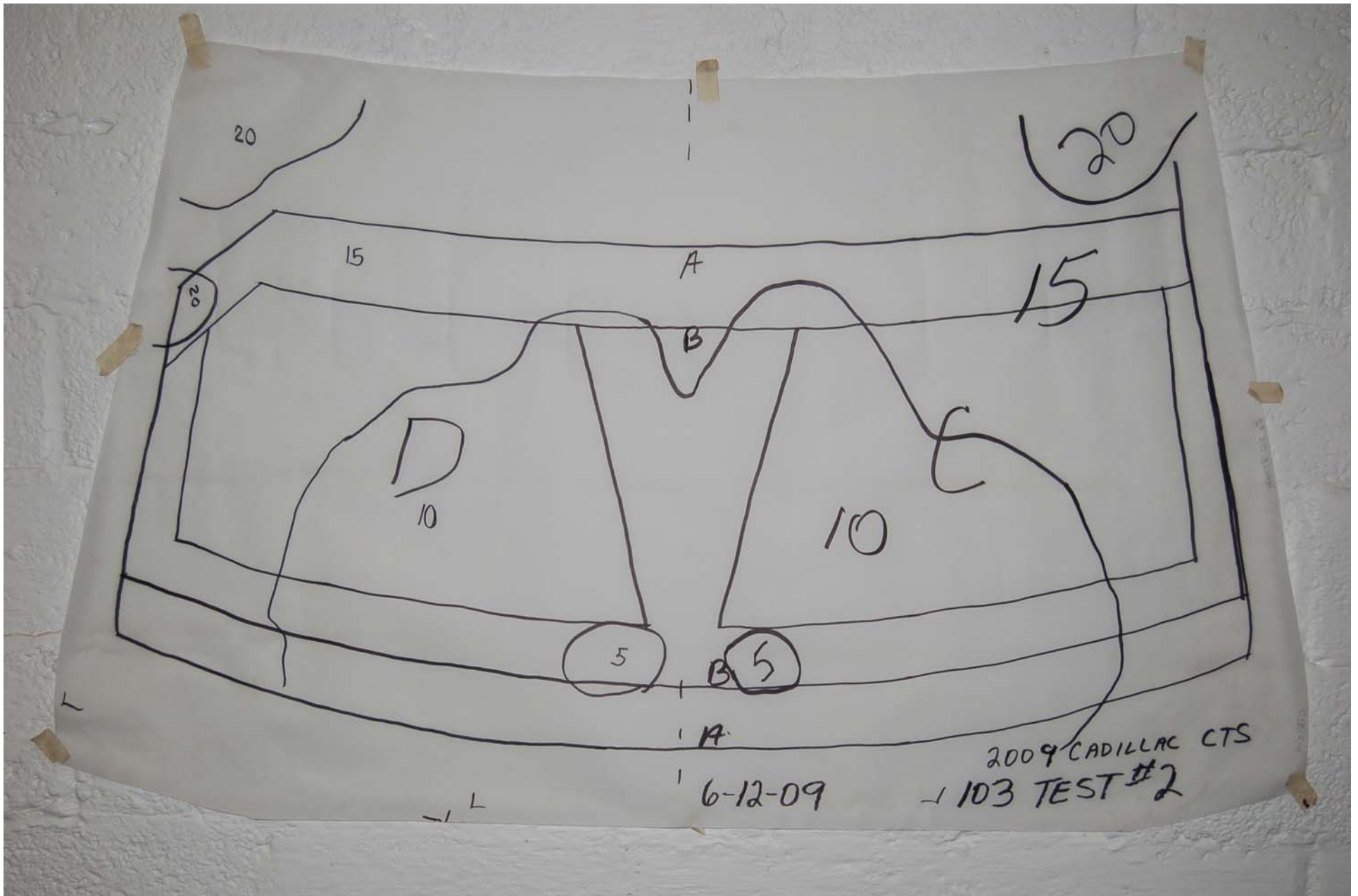
2009 CADILLAC CTS  
NHTSA NO. C90101  
FMVSS NO. 103

FIGURE 5.14  
DEFROSTED AREA AT 15 MINUTES TEST #2



2009 CADILLAC CTS  
NHTSA NO. C90101  
FMVSS NO. 103

FIGURE 5.15  
DEFROSTED AREA AT 20 MINUTES TEST #2



2009 CADILLAC CTS  
NHTSA NO. C90101  
FMVSS NO. 103

FIGURE 5.16  
WINDSHIELD VELLUM PATTERN, POST TEST #2

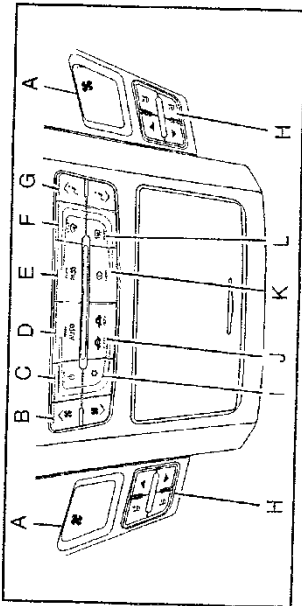
SECTION 6

OWNER'S MANUAL DEFROSTER INSTRUCTIONS

## Climate Controls

### Dual Climate Control System

The heating, cooling, and ventilation for the vehicle can be controlled with this system.



- A. Display
- B. Fan Control
- C. Power
- D. AUTO
- E. PASS (Passenger Climate Control)
- F. Defrost
- G. Air Delivery Mode Control
- H. Temperature Control and Heated Seat
- I. Air Conditioning
- J. Recirculation/Outside Air
- K. Heated Windshield Washer
- L. Rear Window Defogger

### Automatic Operation


**AUTO (Automatic):** The system automatically controls fan speed, air delivery, and air conditioning in order to heat or cool the vehicle to the desired temperature. When the indicator light is on, the system is in full automatic operation. If the air delivery mode or fan setting is manually adjusted, the auto indicator turns off and displays will show the selected settings.

1. Press the AUTO button.
2. Adjust the temperature to a comfortable setting between 70°F (21°C) and 80°F (27°C).  
Choosing the coldest or warmest temperature setting will not cause the system to heat or cool any faster. If the system is set at the warmest temperature setting, it remains in manual mode at that temperature and it will not go into automatic mode.

To avoid blowing cold air in cold weather, the system delays turning on the fan until warm air is available. The system starts out blowing air at the floor, but can automatically change modes as the vehicle warms up to maintain the chosen temperature setting. The length of time needed for warm up depends on the outside temperature and the length of time that has elapsed since the vehicle was last driven.

3. Wait for the system to regulate. This may take from 10 to 30 minutes. Then adjust the temperature, if necessary.

English can be changed to metric units through the Driver Information Center (DIC). See *DIC Vehicle Customization* on page 3-72.


 **(Temperature Control):** The temperature can be adjusted separately for the driver and the passenger. Press to increase or decrease the automatic temperature settings.


**PASS (Passenger Climate Control):** Press to set a different temperature for the passenger. Then adjust the passenger temperature buttons to a comfortable setting.

Pressing the PASS button again automatically sets the passenger's temperature to the driver's setting.


Turning the passenger's temperature display off does not shut the passenger's climate control system off.

## Manual Operation

 **(Power):** Press to turn the climate control system on or off. When the climate control system is turned off the air inlet defaults to outside air.

 **(Fan Control):** Press the buttons to increase or decrease the fan speed. Pressing either button cancels automatic operation and the system goes into manual mode. Press AUTO to return to automatic operation. The blower may reduce during an OnStar<sup>®</sup> session to limit background noise.


If the airflow seems low when the fan speed is at the highest setting, the passenger compartment air filter might need to be replaced. For more information, see *Passenger Compartment Air Filter* on page 3-29 and *Scheduled Maintenance* on page 6-4.


 **(Air Delivery Mode Control):** Press the buttons to change the direction of the airflow. The current mode appears in the display screen. Changing the mode cancels the automatic operation and the system goes into manual mode. Press AUTO to return to automatic operation.





The outboard air outlets always receive some airflow in every mode, except defrost.


To change the current mode, select one of the following:

 **(Vent):** Air is directed to the instrument panel outlets.


 **(Bi-Level):** Air is divided between the instrument panel outlets and the floor outlets. In automatic operation, cooler air is directed to the upper outlets and warmer air to the floor outlets.

 **(Floor):** Air is directed to the floor outlets, with some air directed to the windshield and outboard outlets.

 **(Defog):** This mode clears the windows of fog or moisture. Air is directed to the windshield, floor and side window outlets. When this mode is selected, the system turns off recirculation and runs the air-conditioning compressor unless the outside temperature is at or below freezing. If recirculation is selected while in defog mode, it is cancelled after 10 minutes.

 **(Defrost):** This mode clears the windshield of fog or frost more quickly. Air is directed to the windshield, with some air directed to the side windows. In this mode, the system automatically turns off recirculation and runs the air-conditioning compressor, unless the outside temperature is at or below freezing.

This mode can also cause the fan speed and air temperature to increase.

 **(Air Conditioning):** Press to turn the air conditioning system on or off and override the automatic system. When in AUTO, the air conditioning compressor comes on automatically, as needed.

The air conditioning system removes moisture from the air, so a small amount of water might drip under the vehicle while idling or after turning off the engine. This is normal.



**(Recirculation/Outside Air):** Press this button to switch between recirculation and outside air modes. The indicator light comes on to show which mode is being used. The recirculation mode recirculates and helps to quickly cool the air inside the vehicle. It can be used to prevent outside air and odors from entering the vehicle. Press the auto button to have the system select the best air delivery mode for the temperature setting.

Recirculation is not available in the defrost mode and automatically turns off 10 minutes after defog is selected. This helps to limit window fogging in the vehicle.

Using recirculation for long periods of time could cause the air inside the vehicle to become too dry or stuffy. To prevent this from happening, after the air in the vehicle has cooled, select outside air or press the auto button.

The outside air mode pulls fresh air from outside the vehicle. Outside air is always selected in defrost mode to prevent fogging.

## Rear Window Defogger

The rear window defogger uses a warming grid to remove fog or frost from the rear window. It only works when the ignition is in ON/RUN.

**(Rear Window Defogger):** Press to turn the rear window defogger on or off.

The rear window defogger stays on for about 15 minutes, before turning off if the vehicle is moving at a slower speed. At higher speeds, the rear window defogger may stay on continuously. With each additional press, the defogger runs for about 10 minutes. The defogger can also be turned off by turning off the engine.

The heated outside rearview mirrors turn on when the rear window defogger button is on and helps to clear fog or frost from the surface of the mirror. See *Outside Heated Mirrors* on page 2-53.

**Notice:** Do not try to clear frost or other material from the inside of the front windshield and rear window with a razor blade or anything else that is sharp. This may damage the rear window defogger grid and affect your radio's ability to pick up stations clearly. The repairs wouldn't be covered by your warranty.