REPORT NUMBER 214-GTL-09-005

SAFETY COMPLIANCE TESTING FOR FMVSS NO. 214S SIDE IMPACT PROTECTION (STATIC)

HYUNDAI MOTOR COMPANY
2009 HYUNDAI GENESIS, PASSENGER CAR
NHTSA NO. C90501

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

August 12, 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
INTRODUCTION

1.0 PURPOSE OF COMPLIANCE TEST

A 2009 Hyundai Genesis passenger car was subjected to Federal Motor Vehicle Safety Standard (FMVSS) No. 214 testing to determine if the vehicle was in compliance with the requirements of the standard. FMVSS No. 214 establishes requirements for the side doors of a Motor Vehicle to minimize the safety hazard caused by intrusion into the passenger compartment as a result of a side impact accident.

1.1 TEST VEHICLE

The test vehicle was a 2009 Hyundai Genesis Passenger Car. Nomenclature applicable to the test vehicle are:

A. Vehicle Identification Number: KMHGC46E89U025598

B. NHTSA No.: C90501

C. Manufacturer: HYUNDAI MOTOR COMPANY

D. Manufacture Date: JUN/20/08

The vehicle's front and rear seating systems were removed for this test. All vehicle windows were closed and all doors were locked for this test.

1.2 TEST DATE

The test vehicle was subjected to FMVSS No. 214 testing on August 4, 2009.

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-214S-05 dated 14 September 1993 and General Testing Laboratories, Inc. (GTL) Test Procedure, TP-214S-05, "Static – Side Impact Protection".

Each vehicle shall be able to meet the requirements of either, at the manufacturer's option, 2.1 or 2.2 when any of its side doors that can be used for occupant egress are tested.

2.1 OPTION ONE

With any seats that may affect load upon or deflection of the side of the vehicle removed from the vehicle, each vehicle must be able to meet the requirements of 2.1.1 through 2.1.3.

2.1.1 INITIAL CRUSH RESISTANCE

The initial crush resistance shall not be less than 2,250 pounds.

2.1.2 INTERMEDIATE CRUSH RESISTANCE

The intermediate crush resistance shall not be less than 3,500 pounds.

2.1.3 PEAK CRUSH RESISTANCE

The peak crush resistance shall not be less than two times the curb weight of the vehicle or 7,000 pounds, whichever is less.

2.2 OPTION TWO

With seats installed in the vehicle, and located in any horizontal or vertical position to which they can be adjusted and at any seat back angle to which they can be adjusted, each vehicle must be able to meet the requirements of 2.2.1 through 2.2.3.

2.2.1 INITIAL CRUSH RESISTANCE

The initial crush resistance shall not be less than 2,250 pounds.

2.2.2 INTERMEDIATE CRUSH RESISTANCE

The intermediate crush resistance shall not be less than 4,375 pounds.

SECTION 2 CONTINUED

2.2.3 PEAK CRUSH RESISTANCE

The peak crush resistance shall not be less than three and one half times the curb weight of the vehicle or 12,000 pounds, whichever is less.

SECTION 3
COMPLIANCE TEST DATA

DATA SHEET 1
TEST VEHICLE RECEIVING-INSPECTION

VEH. MOD YR/MAKE/MODEL/BODY: 2009 HYUNDAI GENESIS PASSENGER CAR
VEH. BUILD DATE: JUN/20/08 ; TEST DATE: AUGUST 4, 2009
TEST LABORATORY: GENERAL TESTING LABS
OBSERVERS: G. FARRAND, J. LATANE

A. First compliance test by laboratory for this vehicle is the static FMVSS 214 test.

___ Yes X No (Go to item 2)

X (1) Label test vehicle with NHTSA Number

X (2) Verify all options on the "window sticker" are present on the vehicle

X (3) Verify tires and wheel rims are new and the same as listed

X (4) Verify there are no dents or other interior or exterior flaws

X (5) Verify the glove box contains an owner's manual, warranty document, consumer information, and extra keys

X (6) Verify the vehicle is equipped with the proper fuel filler cap

X (7) If the vehicle has been delivered from the dealer, verify the vehicle has been properly prepared and is in running condition

B. Verify seat adjusters are working
X Yes ___ No

C. Verify there is a seat belt at each seating position
X Yes ___ No

D. Without disturbing the integrity of each seat belt and anchorage, verify that each seat belt is attached to the anchorage. For seat belts that are attached to the seat, also verify the seats are attached to the seat anchors and the seat anchors are attached to the vehicle.
X Yes ___ No

E. Curb Weight of Vehicle: 3737 LBS. (1695 KG)

F. COMMENTS: (Explain any problems here)

RECORDED BY: G. FARRAND DATE: 08/04/09

APPROVED BY: D. MESSICK

DATA SHEET 2
PRETEST PREPARATION

VEH. MOD YR/MAKE/MODEL/BODY: 2009 HYUNDAI GENESIS PASSENGER CAR
VEH. NHTSA NO.: C90501 ; VIN: KMHGC46E89U025598
VEH. BUILD DATE: JUN/20/08 ; TEST DATE: AUGUST 4, 2009
TEST LABORATORY: GENERAL TESTING LABS
OBSERVERS: G. FARRAND, J. LATANE

Prior to testing the following will be accomplished:

		TEST 1	TEST 2
A.	Check the manufacturers certification statement to determine if the vehicle should be tested with or without seats installed.	X	X
B.	Remove all seats unless the vehicle has been certified with the seats installed. If the seats remain in the vehicle, they are to be adjusted per the COTR's instructions.	X	X
C.	Close all windows	X	X
D.	Lock All doors	X	X
E.	State door tested	LF	RR
F.	State the length of a horizontal line drawn on door through a point 5 inches vertically above lowest point of test door	44.5	28.1
G.	State vertical distance from the lowest part of test door to bottom of loading device	5"	5"
H.	State position of vertical centerline of loading device on the midpoint of line determined step F	22.3	14.1
I.	Determine that the vertical axis of the loading device is perpendicular to the longitudinal and lateral axis of the test vehicle	X	X
J.	Determine that the top of the loading device is above the door window opening but not touching any structure above the window opening	X	X

RECORDED BY: G. FARRAND DATE: 08/04/09

APPROVED BY: D. MESSICK

DATA SHEET 3
STATIC LOAD TEST - BACK-UP SYSTEM DATA

VEH. MOD YR/MAKE/MODEL/BODY: 2009 HYUNDAI GENESIS PASSENGER CAR
VEH. NHTSA NO.: C90501 ; VIN: KMHGC46E89U025598
VEH. BUILD DATE: JUN/20/08 ; TEST DATE: AUGUST 4, 2009
TEST LABORATORY: GENERAL TESTING LABS
OBSERVERS: G. FARRAND, J. LATANE

RESULTS: Plots of load versus displacement and time versus displacement obtained from the back-up data (attach plots to data sheet) showed that:

TEST #1 - GTL #6277 (LEFT FRONT DOOR)

A. The initial crush resistance was 3354 lbs.

B. The intermediate crush resistance was 5917 lbs.

C. The peak crush resistance was 11,128 lbs at 12.2 inches

D. The rate of loading was .2"/sec

The dial indicator and the inclinometer showed the following deflections.

LOADING DEVICE TRAVEL	DIAL INDICATOR	INCLINOMETER
0 inches	0.0000	0
2 inches	0.03	0
4 inches	0.07	0
6 inches	0.12	0
12 inches	0.25	0
12.2 Inches (full travel)	0.25	0
0 Inches (removal)	0.05	0

TEST #2 - GTL #6278 (RIGHT REAR DOOR)

A. The initial crush resistance was 4296 lbs.

B. The intermediate crush resistance was 6754 lbs.

C. The peak crush resistance was 13,755 lbs at 12.2 inches

D. The rate of loading was .2"/sec

DATA SHEET 3 CONTINUED
STATIC LOAD TEST - BACK-UP SYSTEM DATA

The dial indicator and the inclinometer showed the following deflections.

LOADING DEVICE TRAVEL	DIAL INDICATOR	INCLINOMETER
0 inches	0.0000	0
2 inches	0.03	0
4 inches	0.07	0
6 inches	0.12	0
12 inches	0.24	0
12.2 Inches (full travel)	0.24	0
0 Inches (removal)	0.05	0

RECORDED BY: G. FARRAND DATE: 08/04/09

APPROVED BY: D. MESSICK

DATA SHEET 4
DATA REDUCTION

VEH. MOD YR/MAKE/MODEL/BODY: 2009 HYUNDAI GENESIS PASSENGER CAR
VEH. NHTSA NO.: C90501 ; VIN: KMHGC46E89U025598
VEH. BUILD DATE: JUN/20/08 ; TEST DATE: AUGUST 4, 2009
TEST LABORATORY: GENERAL TESTING LABS
OBSERVERS: G. FARRAND, J. LATANE

Data from the primary data systems will be analyzed and the plots attached to the data sheet.

RESULTS - The load versus displacement plot showed that - -

TEST #1 - GTL #6277 (LEFT FRONT DOOR)

A. The initial crush resistance was 3354 lbs.
B. The intermediate crush resistance was 5917 lbs.
C. The peak crush resistance was 11,128 lbs at 12.2 inches

The time versus displacement plot showed that - -

The rate of loading was .2"/sec

TEST #2 - GTL #6278 (RIGHT REAR DOOR)

A. The initial crush resistance was 4296 lbs.
B. The intermediate crush resistance was 6754 lbs.
C. The peak crush resistance was 13,755 lbs at 12.2 inches
The time versus displacement plot showed that - -

The rate of loading was .2"/sec

Comparison of the ABOVE DATA with the BACKUP DATA indicates the following - -

Primary and Backup data agree.

RECORDED BY: G. FARRAND DATE: 08/04/09

APPROVED BY: D. MESSICK

SECTION 4

TEST EQUIPMENT LIST

EQUIPMENT	DESCRIPTION	MODEL/ SERIAL NO.	CAL. DATE	NEXT CAL. DATE
COMPUTER	AT&T	486DX266	N/A	N/A
TEST FIXTURE	GTL 214	214	N/A	N/A
A/D INTERFACE	METRABYTE	DAS-16(F)	BEFORE USE	BEFORE USE
SCALES	INTERCOMP	199744	04/09	04/10
SIGNAL CONDITIONER	METRABYTE	EXP-RES	BEFORE USE	BEFORE USE
LOAD CELL	TRANSDUCER INC.	18550	11/08	11/09
LINEAR POT.	WALDALE WALDALE	123456A 123456B	BEFORE USE	BEFORE USE
INCLINOMETER	STARRETT	360/002	BEFORE USE	BEFORE USE
DIAL INDICATOR	MIOTO	0001-2	BEFORE USE	BEFORE USE

SECTION 5

PHOTOGRAPHS

2009 HYUNDAI GENESIS
NHTSA NO. C90501
FMVSS NO. 214

FIGURE 5.1
FRONT VIEW OF VEHICLE PRE-TEST

2009 HYUNDAI GENESIS
NHTSA NO. C90501
FMVSS NO. 214

FIGURE 5.2
LEFT SIDE VIEW OF VEHICLE PRE-TEST

2009 HYUNDAI GENESIS
NHTSA NO. C90501
FMVSS NO. 214

FIGURE 5.3
RIGHT SIDE VIEW OF VEHICLE PRE-TEST

2009 HYUNDAI GENESIS
NHTSA NO. C90501
FMVSS NO. 214

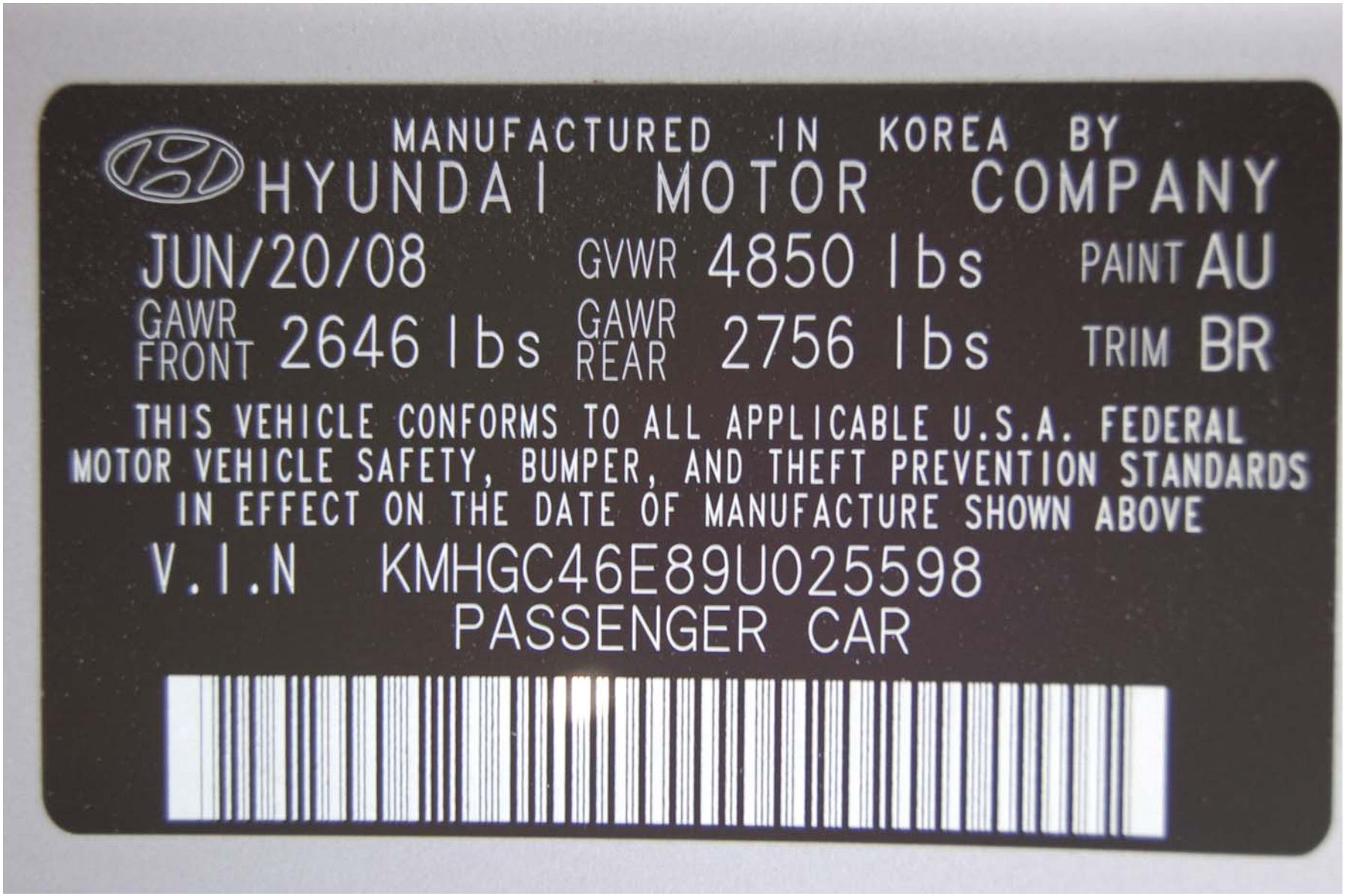
FIGURE 5.4
REAR VIEW OF VEHICLE PRE-TEST

2009 HYUNDAI GENESIS
NHTSA NO. C90501
FMVSS NO. 214

FIGURE 5.5
¾ FRONTAL VIEW FROM LEFT SIDE OF VEHICE
PRE-TEST

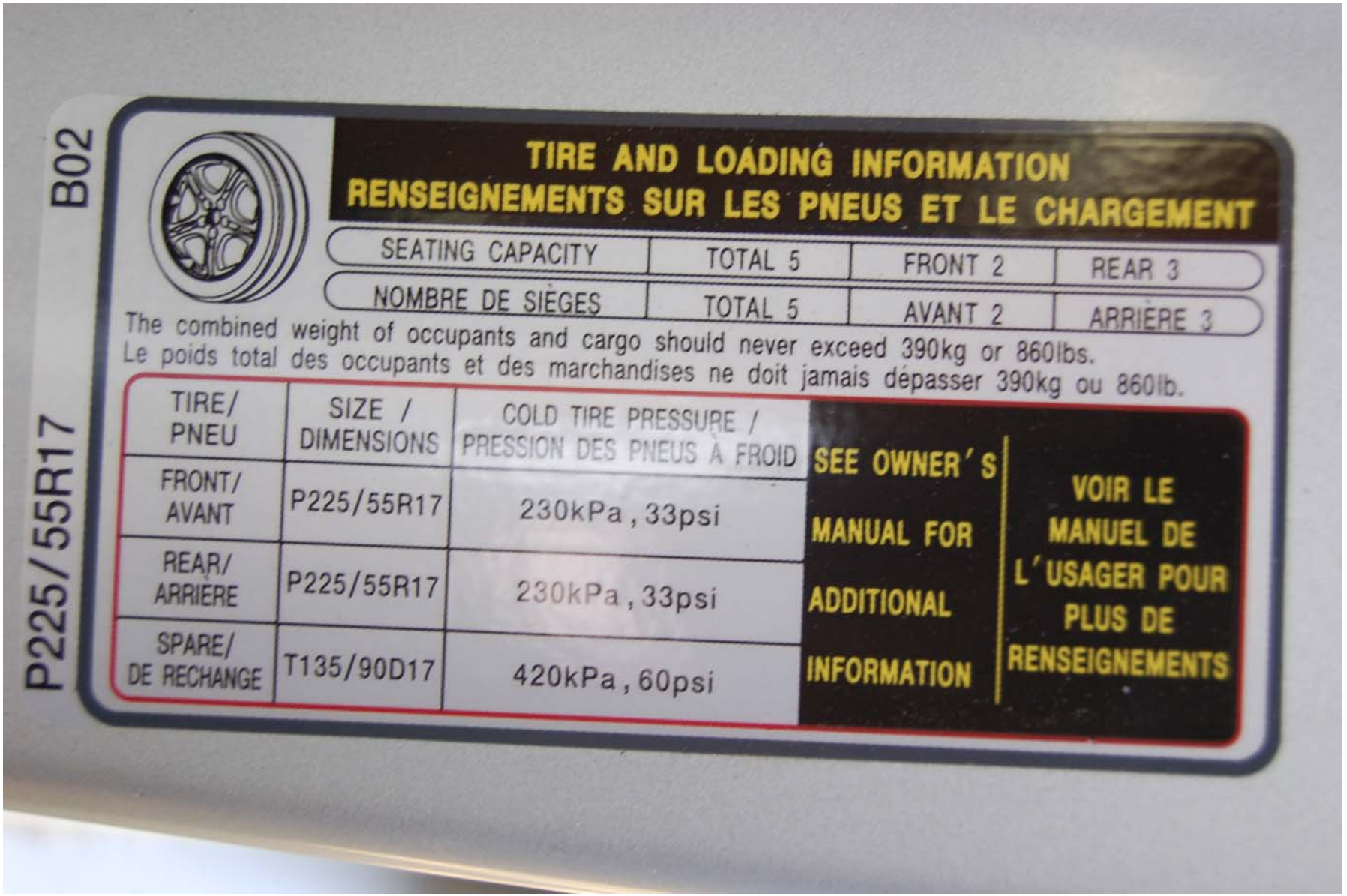
2009 HYUNDAI GENESIS
NHTSA NO. C90501
FMVSS NO. 214

FIGURE 5.6
¾ REAR VIEW FROM RIGHT SIDE OF VEHICLE
PRE-TEST



2009 HYUNDAI GENESIS
NHTSA NO. C90501
FMVSS NO. 214

FIGURE 5.7
VEHICLE CERTIFICATION LABEL



2009 HYUNDAI GENESIS
NHTSA NO. C90501
FMVSS NO. 214

FIGURE 5.8
VEHICLE TIRE INFORMATION LABEL

2009 HYUNDAI GENESIS
NHTSA NO. C90501
FMVSS NO. 214

FIGURE 5.9
VEHICLE VIN PLATE

2009 HYUNDAI GENESIS
NHTSA NO. C90501
FMVSS NO. 214

FIGURE 5.10
INSTRUMENTATION SET-UP

2009 HYUNDAI GENESIS
NHTSA NO. C90501
FMVSS NO. 214

FIGURE 5.11
REAR VEHICLE TIE DOWN – TEST 1

2009 HYUNDAI GENESIS
NHTSA NO. C90501
FMVSS NO. 214

FIGURE 5.12
FRONT VEHICLE TIE DOWN – TEST 1

2009 HYUNDAI GENESIS
NHTSA NO. C90501
FMVSS NO. 214

FIGURE 5.13
INCLINOMETER PRE-TEST 1

2009 HYUNDAI GENESIS
NHTSA NO. C90501
FMVSS NO. 214

FIGURE 5.14
DIAL INDICATOR PRE-TEST 1

2009 HYUNDAI GENESIS
NHTSA NO. C90501
FMVSS NO. 214

FIGURE 5.15
LOAD DEVICE AGAINST DOOR – PRE-TEST 1

2009 HYUNDAI GENESIS
NHTSA NO. C90501
FMVSS NO. 214

FIGURE 5.16
LOAD DEVICE AGAINST DOOR @ MAX LOAD – TEST 1

2009 HYUNDAI GENESIS
NHTSA NO. C90501
FMVSS NO. 214

FIGURE 5.17
INCLINOMETER AT MAX LOAD – TEST 1

2009 HYUNDAI GENESIS
NHTSA NO. C90501
FMVSS NO. 214

FIGURE 5.18
DIAL INDICATOR AT MAX LOAD – TEST 1

2009 HYUNDAI GENESIS
NHTSA NO. C90501
FMVSS NO. 214

FIGURE 5.19
POST TEST DOOR OUTSIDE – TEST 1

2009 HYUNDAI GENESIS
NHTSA NO. C90501
FMVSS NO. 214

FIGURE 5.20
POST TEST DOOR INSIDE – TEST 1

2009 HYUNDAI GENESIS
NHTSA NO. C90501
FMVSS NO. 214

FIGURE 5.21
REAR VEHICLE TIE DOWN – TEST 2

2009 HYUNDAI GENESIS
NHTSA NO. C90501
FMVSS NO. 214

FIGURE 5.22
FRONT VEHICLE TIE DOWN – TEST 2

2009 HYUNDAI GENESIS
NHTSA NO. C90501
FMVSS NO. 214

FIGURE 5.23
INCLINOMETER PRE-TEST 2

2009 HYUNDAI GENESIS
NHTSA NO. C90501
FMVSS NO. 214

FIGURE 5.24
DIAL INDICATOR – PRE-TEST 2

2009 HYUNDAI GENESIS
NHTSA NO. C90501
FMVSS NO. 214

FIGURE 5.25
LOAD DEVICE AGAINST DOOR – PRE-TEST 2

2009 HYUNDAI GENESIS
NHTSA NO. C90501
FMVSS NO. 214

FIGURE 5.26
LOAD DEVICE AGAINST DOOR @ MAX LOAD – TEST 2

2009 HYUNDAI GENESIS
NHTSA NO. C90501
FMVSS NO. 214

FIGURE 5.27
INCLINOMETER AT MAX LOAD – TEST 2

2009 HYUNDAI GENESIS
NHTSA NO. C90501
FMVSS NO. 214

FIGURE 5.28
DIAL INDICATOR AT MAX LOAD – TEST 2

2009 HYUNDAI GENESIS
NHTSA NO. C90501
FMVSS NO. 214

FIGURE 5.29
POST TEST DOOR OUTSIDE – TEST 2

2009 HYUNDAI GENESIS
NHTSA NO. C90501
FMVSS NO. 214

FIGURE 5.30
POST TEST DOOR INSIDE – TEST 2

2009 HYUNDAI GENESIS
NHTSA NO. C90501
FMVSS NO. 214

FIGURE 5.31
FRONT VIEW OF VEHICLE POST TEST

2009 HYUNDAI GENESIS
NHTSA NO. C90501
FMVSS NO. 214

FIGURE 5.32
LEFT SIDE VIEW OF VEHICLE POST TEST

2009 HYUNDAI GENESIS
NHTSA NO. C90501
FMVSS NO. 214

FIGURE 5.33
RIGHT SIDE VIEW OF VEHICLE POST TEST

2009 HYUNDAI GENESIS
NHTSA NO. C90501
FMVSS NO. 214

FIGURE 5.34
REAR VIEW OF VEHICLE POST TEST

2009 HYUNDAI GENESIS
NHTSA NO. C90501
FMVSS NO. 214

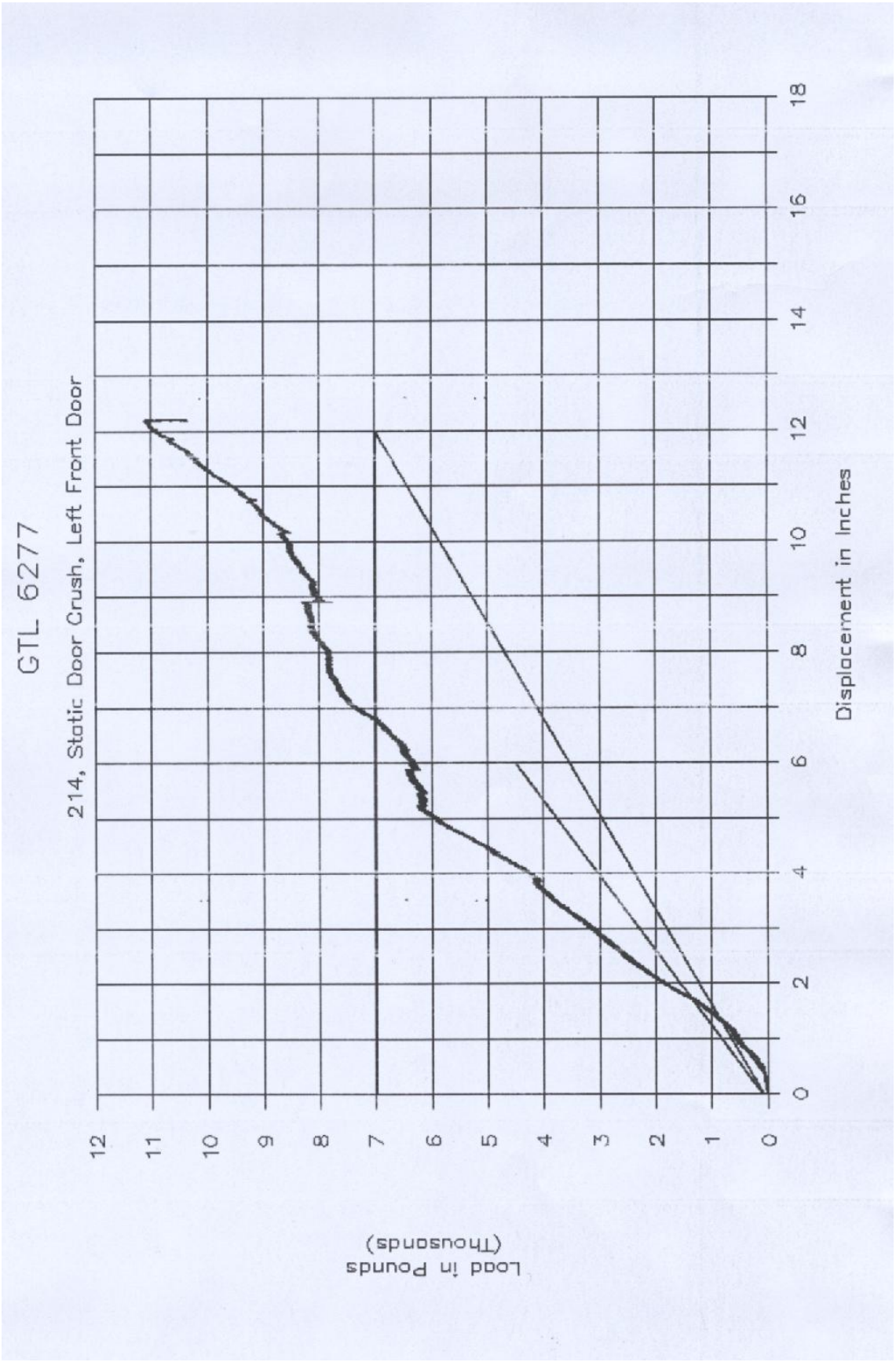
FIGURE 5.35
¾ FRONTAL VIEW FROM LEFT SIDE OF VEHICLE
POST TEST

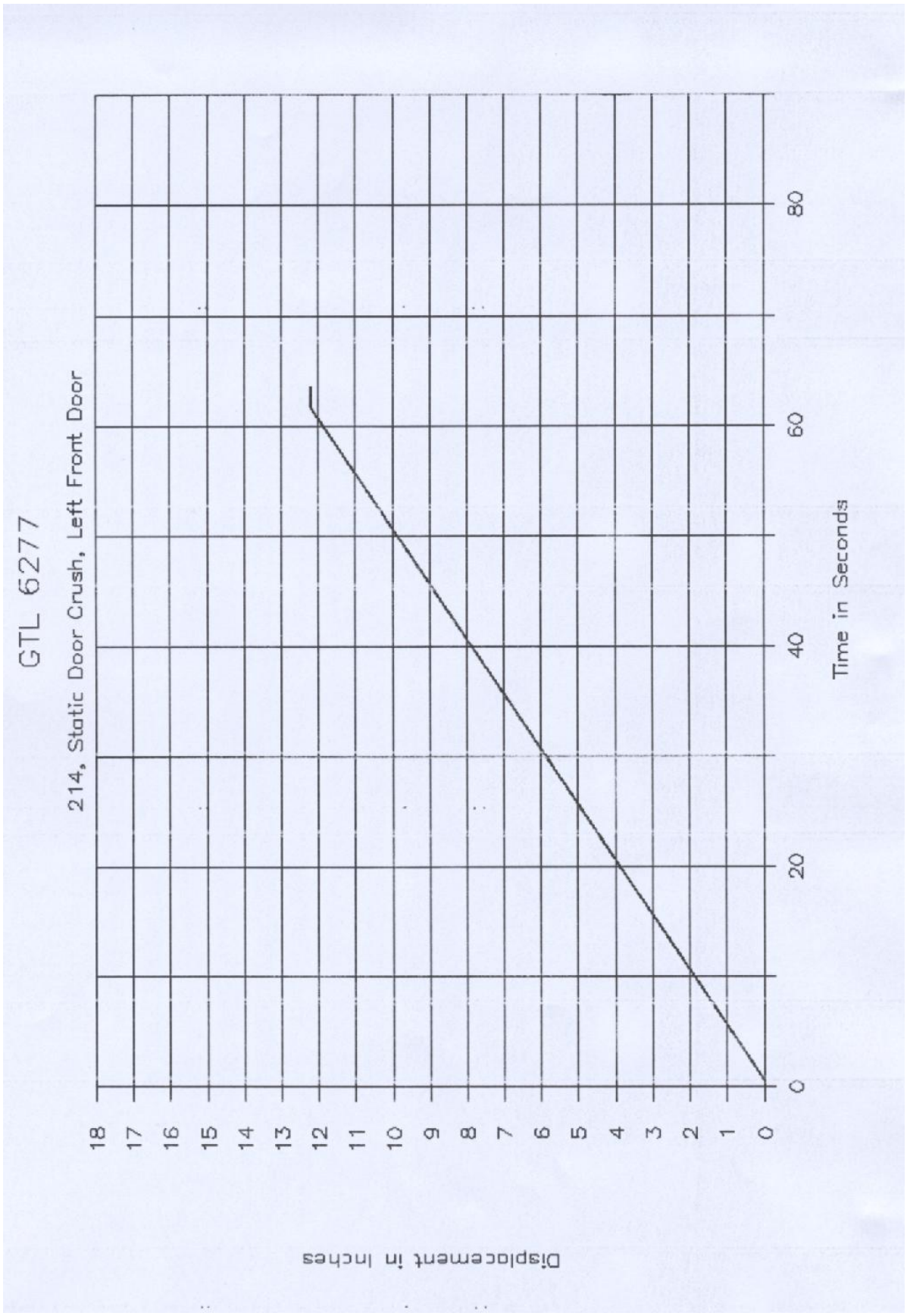
2009 HYUNDAI GENESIS
NHTSA NO. C90501
FMVSS NO. 214

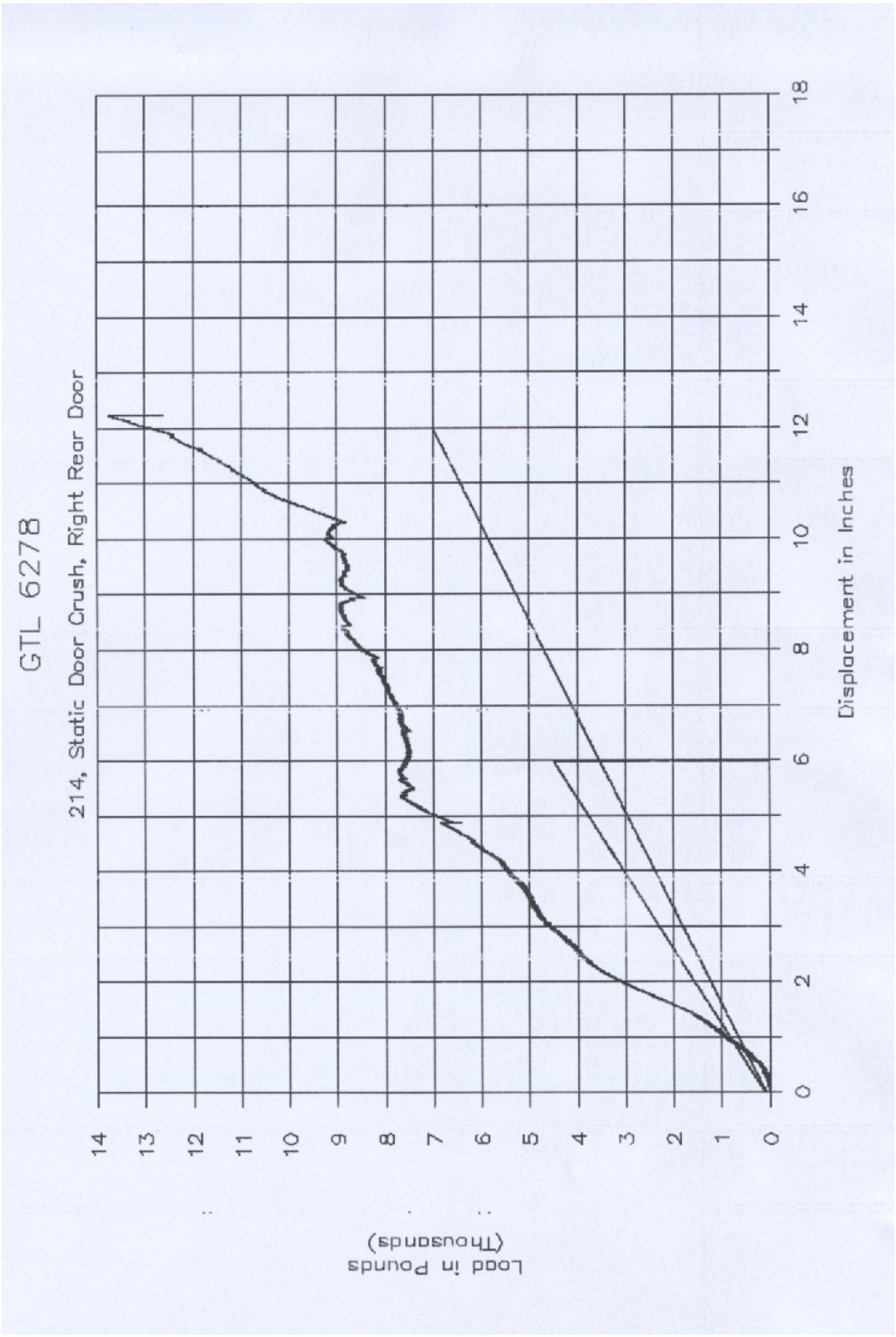
FIGURE 5.36
¾ REAR VIEW FROM RIGHT SIDE OF VEHICLE POST TEST

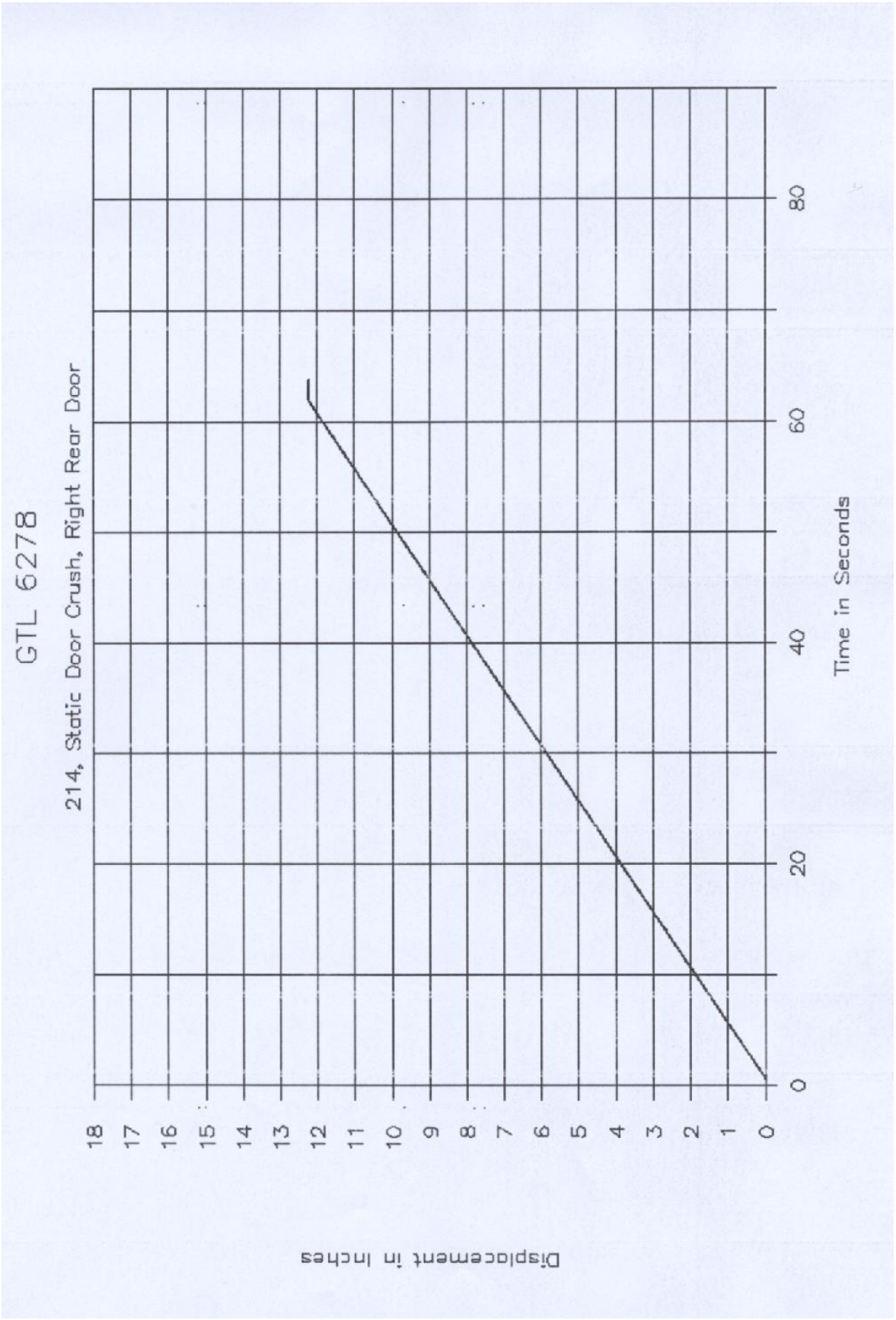
SECTION 6

TEST DATA PLOTS


GTL 6277
214, Static Door Crush, Left Front Door
Load in Pounds
(Thousands)
0
1
2
3
4
5
6
7
8
9
10
11
12
0
2
4
6
8
10
12
14
16
18
Displacement in Inches


GTL 6277
214, Static Door Crush, Left Front Door
Displacement in Inches
0
1
2
3
4
5
6
7
8
9
10
11
12
13
14
15
16
17
18
0
20
40
60
80
Time in Seconds


GTL 6278
214, Static Door Crush, Right Rear Door
Load in Pounds
(Thousands)
Displacement in Inches
0
1
2
3
4
5
6
7
8
9
10
11
12
13
14
0
2
4
6
8
10
12
14
16
18


GTL 6278
214, Static Door Crush, Right Rear Door
Displacement in Inches
Time in Seconds
0
1
2
3
4
5
6
7
8
9
10
11
12
13
14
15
16
17
18
0
20
40
60
80