

REPORT NUMBER 110(IND)-GTL-03-004

**SAFETY COMPLIANCE TESTING FOR
FMVSS NO. 110(INDICANT)
TIRE SELECTION AND RIMS**

**HYUNDAI MOTOR COMPANY
2003 HYUNDAI SANTA FE, MPV
NHTSA NO. C30508**

**GENERAL TESTING LABORATORIES, INC.
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SEPTEMBER 03, 2003

FINAL REPORT

PREPARED FOR

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

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	15. Supplementary Notes	
16. Abstract This test was conducted on the subject, 2003 Hyundai Santa Fe MPV in accordance with the specifications of the Office of Vehicle Safety Compliance Test Procedure No. TP-110-02 (partial), to gather data relating to the normal load requirements specified in FMVSS 110. NHTSA's Office of Safety Performance Standards requested this data to support the agency's TREAD tire rulemaking efforts.		
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SECTION 1

INTRODUCTION

1.0 PURPOSE OF INDICANT TEST

A 2003 Hyundai Santa Fe MPV was subjected to a FMVSS No. 110 (Indicant) test intended to gather data relating to the normal load requirements specified in FMVSS 110. NHTSA's Office of Safety Performance Standards requested this data to support the agency's TREAD tire rulemaking efforts.

1.1 TEST VEHICLE

The test vehicle was a 2003 Hyundai Santa Fe MPV. Nomenclature applicable to the test vehicle are:

- A. Vehicle Identification Number: KM8SB12B83U411971
- B. NHTSA No.: C30508
- C. Manufacturer: HYUNDAI MOTOR COMPANY
- D. Manufacture Date: Nov/20/02

1.2 TEST DATE

The test vehicle was subjected to testing on May 20, 2003.

SECTION 2

TEST PROCEDURE AND SUMMARY OF RESULTS

2.0 TEST PROCEDURE

The vehicle was inspected, photographed and filled with fuel. It was then weighed to establish total curb weight and the weights of all wheels were measured and recorded. The vehicle was then ballasted to its normal load condition (refer to appendix) and the weights of all wheels were measured and recorded. Tire information labeling data and tire sidewall data were recorded.

This indicant test did not include any other requirements in FMVSS 110.

2.1 SUMMARY OF RESULTS

Currently FMVSS 110 applies only to passenger cars. The subject Hyundai Santa Fe is a multipurpose passenger vehicle (MPV) and therefore it is not required to meet FMVSS 110 requirements. It was subjected to the normal load testing as executed for FMVSS 110 compliance verification for information only.

SECTION 3

TEST DATA

DATA SHEET 1

SUMMARY

VEHICLE MAKE/MODEL/BODY STYLE: 2003 HYUNDAI SANTA FE MPV
 VEHICLE NHTSA NO.: C30508 ; VIN: KM8SB12B83U411971
 LABORATORY: GENERAL TESTING LABORATORIES
 TEST DATE: 05/20/03

<u>REQUIREMENT</u>	<u>YES/NO</u>
The vehicle is equipped with tires that meet the requirements of FMVSS 109 or FMVSS 119.	<u>YES</u>
The vehicle normal load on the tire is not greater than the high speed performance test load specified in FMVSS 109 paragraph S5.5 or FMVSS 119 paragraph S7.4.	<u>YES</u>
For passenger cars, the tire information placard is permanently affixed to the glove compartment door or equally accessible location; and displays the required information (FMVSS 110, S4.3).	<u>N/A</u>
For vehicles other than passenger cars, a combined certification/ tire information label or separate tire information label is permanently affixed to either the hinge pillar, door-latch post or to the inward-facing surface of the door next to the driver's seating position (FMVSS 120, S5.3).	<u>YES</u>

REMARKS:

RECORDED BY: M. A. B. B.

DATE: 05/20/03

APPROVED BY: D. Messick

DATA SHEET 2
TEST VEHICLE INFORMATION/RECEIVING INSPECTION

LABORATORY: GENERAL TESTING LABORATORIES DATE: 05/20/03

VEHICLE MODEL YEAR/MAKE/MODEL/BODY STYLE: 2003 HYUNDAI SANTA FE MPV

MANUFACTURE DATE: Nov/20/02 NHTSA NO.: C30508 BODY COLOR: GOLD

VIN: KM8SB12B83U411971 VEHICLE TYPE: MPV

GVWR 2209 kg (4870 lbs) GAWR(Fr) 1200 kg (2645 lbs) GAWR(Rr) 1300 kg (2865 lbs)

BELTED SEATING POSITIONS: FRONT 2 MID N/A REAR 3 OTHER N/A

ENGINE DATA: 4 Cylinders 2.4 Liters Cubic Inches

TRANSMISSION DATA: Automatic X Manual 5 No. of Speeds

FINAL DRIVE DATA: Rear Drive X Front Drive 4 Wheel Drive

INSTALLED TIRE DATA: Size - P225/70R16 Mfr. - BRIDGESTONE

CHECK APPROPRIATE BOXES FOR VEHICLE EQUIPMENT/MAKE SURE ALL OPTIONS ON WINDOW STICKER ARE LISTED:

<input checked="" type="checkbox"/>	Air Conditioning		Traction Control	<input checked="" type="checkbox"/>	Clock
<input checked="" type="checkbox"/>	Tinted Glass		All Wheel Drive	<input checked="" type="checkbox"/>	Roof Rack
<input checked="" type="checkbox"/>	Power Steering	<input checked="" type="checkbox"/>	Cruise Control	<input checked="" type="checkbox"/>	Console
<input checked="" type="checkbox"/>	Power Windows	<input checked="" type="checkbox"/>	Rear Window Defroster	<input checked="" type="checkbox"/>	Driver Air Bag
<input checked="" type="checkbox"/>	Power Door Locks		Sun Roof or T-Top	<input checked="" type="checkbox"/>	Passenger Air Bag
	Power Seat(s)	<input checked="" type="checkbox"/>	Tachometer	<input checked="" type="checkbox"/>	Front Disc Brakes
<input checked="" type="checkbox"/>	Power Brakes	<input checked="" type="checkbox"/>	Tilt Steering Wheel	<input checked="" type="checkbox"/>	Rear Disc Brakes
	Antilock Brake System	<input checked="" type="checkbox"/>	AM/FM/CD		Other -

ARE ALL OPTIONS LISTED ON "WINDOW STICKER" PRESENT ON THE TEST VEHICLE:
 (YES/NO) Yes

REMARKS:

RECORDED BY: M. A. [Signature]

DATE: 05/20/03

APPROVED BY: D. [Signature]

DATA SHEET 3
CURB WEIGHT WITH OPTIONS AND NORMAL LOAD

VEHICLE MAKE/MODEL/BODY STYLE: 2003 HYUNDAI SANTA FE MPV
 VEHICLE NHTSA NO.: C30508 ; VIN: KM8SB12B83U411971
 LABORATORY: GENERAL TESTING LABORATORIES
 TEST DATE: 05/20/03

Full Fluid Levels:

Fuel Full ; Coolant Full ; Other Fluids Full

Tire Pressure: LF 220 KPA (32 psi) LR 220 KPA (32 psi)
 RF 220 KPA (32 psi) RR 220 KPA (32 psi)

A. MEASURED CURB WEIGHT WITH INSTALLED OPTIONS AND ACCESSORIES

LF <u>492</u> KG (1084 LB)	LR <u>334</u> KG (737 LB)
RF <u>479</u> KG (1056 LB)	RR <u>350</u> KG (772 LB)
Front Axle <u>971</u> KG (2140 LB)	Rear Axle <u>684</u> KG (1509 LB)
Total Vehicle <u>1655</u> KG (3649 LB)	

B. MEASURED VEHICLE WEIGHT IN NORMAL LOAD CONDITION

(1) Seating Capacity (from Tire Information Placard) = 5
 Seating Capacity (# of belted seating positions) = 5

(2) Normal Load # of Occupants from Appendix
 Occupant Distribution: Front Seat- 2 Second Seat- 1
 Third Seat - N/A Fourth Seat- N/A

(3) Total Normal Occupant Load 204 KG (450 LB)
 (# of occupants x 68 KG per occupant)

(4) Measured Normal Load on each Wheel and Axles (Sum)

LF <u>540</u> KG (1190 LB)	LR <u>390</u> KG (860 LB)
RF <u>527</u> KG (1161 LB)	RR <u>406</u> KG (895 LB)
Frt Axle <u>1066</u> KG (2351 LB)	Rr Axle <u>796</u> KG (1755 LB)
Total Vehicle <u>1862</u> KG (4106 LB)	

DATA SHEET 3 – CONTINUED

- (5) Calculated Vehicle Normal Load on the Tire
 Front Tires (measured front axle normal load/2) = 533 KG (1176 LB)
 Rear Tires (measured front axle normal load/2) = 398 KG (878 LB)
- (6) High Speed Test Load from () FMVSS 109 (S5.5), or (X) FMVSS 119 (S7.4)

	Front	Rear
(a) Installed Tire Size	<u>P225/70R16</u>	<u>P225/70R16</u>
Max. Load Rating on Sidewall	<u>850 KG(1874 LBS)</u>	<u>850 KG(1874 LBS)</u>
Reduced Sidewall Load Rating (if applicable)*	<u>773 KG(1704 LBS)</u>	<u>773 KG(1704 LBS)</u>
High Speed Test Load (88% of sidewall max. load rating)	<u>680 KG(1500 LBS)</u>	<u>680 KG(1500 LBS)</u>
(b) Optional Tire Size(s)	<u>NONE</u>	<u>NONE</u>

* If a passenger car tire is installed on a multipurpose passenger vehicle (MPV), truck or bus, the tire's load rating shall be reduced by dividing by 1.10.

REMARKS: The Vehicle Normal Load on the Tire is not greater than the High Speed Test Load.

RECORDED BY:

M. A. G. H.

DATE:

05/20/03

APPROVED BY:

D. Mesick

DATA SHEET 4
TIRE INFORMATION LABEL OR PLACARD

VEHICLE MAKE/MODEL/BODY STYLE: 2003 HYUNDAI SANTA FE MPV
 VEHICLE NHTSA NO.: C30508 ; VIN: KM8SB12B83U411971
 LABORATORY: GENERAL TESTING LABORATORIES
 TEST DATE: 05/20/03

A. Vehicle Type from Certification Label: MPV

B. Identify Vehicle Labeling:

Vehicle has a combined Certification Tire Information Label ☐ Yes ☒ No
 Is Label Permanently Affixed: ☐ Yes ☐ No
 Label Location: _____
 Description of Label: _____

Vehicle has a separate Tire Information Label or Placard ☒ Yes ☐ No
 Is Label Permanently Affixed: ☒ Yes ☐ No
 Label Location: Bottom of Driver's Side Door Jam at "B" Pillar
 Description of Label: Foil Sticker

C. Enter Information from Combined or Separate Tire Information Label/Placard

Vehicle Capacity Weight - 400 KG (880 LBS)

Designated Seating Capacity (DSC) - 5 (2 Front, 3 Rear)
 Expressed In—

(1) Total No. of Occupants ☒ Yes ☐ No

(2) Terms of Occupants for Each Seat Location ☒ Yes ☐ No

Manufacturer's Recommended Tire Size(s) and Cold Tire Inflation Pressure(s) for Maximum Load Vehicle Weight:

P225/70R16 FRONT - 221 kPa (32 psi)
 REAR - 221 kPa (32 psi)

Manufacturer's Recommended Tire Size(s) and Cold Tire Inflation Pressure(s) for Other Load Conditions: P225/70R16 tires at 207 kPa (30 psi) Front and Rear axles for a load of two occupants.

REMARKS: The Santa Fe is equipped with an FMVSS 110 type label even though it is an MPV required to meet the requirements of FMVSS 120.

RECORDED BY: M. P. Bly

DATE: 05/20/03

APPROVED BY: N. M. M. M.

DATA SHEET 5
VEHICLE TIRE DATA

VEHICLE MAKE/MODEL/BODY STYLE: 2003 HYUNDAI SANTA FE MPV
 VEHICLE NHTSA NO.: C30508 ; VIN: KM8SB12B83U411971
 LABORATORY: GENERAL TESTING LABORATORIES
 TEST DATE: 05/20/03

All tires on the vehicle are the same size: (Yes/No) Yes

INFORMATION FROM TIRE SIDEWALL:

Right Front Tire

Tire Size Designation	<u>P225/70R16</u>
Tire Load Index/Speed Symbol	<u>102T</u>
Maximum Inflation Pressure	<u>300 kPa (44 psi)</u>
Maximum Load Rating	<u>850 KG (1874 LBS.)</u>
Mfr. Name or Brand & Code	<u>BRIDGESTONE</u>
Tube or Tubeless	<u>TUBELESS</u>
Treadwear/Traction/Temp. Grades	<u>300/B/B</u>
Sidewall (Plies & Composition)	<u>2 PLY POLYESTER</u>
Tread (Plies & Composition)	<u>2 PLY POLYESTER</u> <u>2 PLY STEEL</u> <u>1 PLY NYLON</u>
Serial Number: Right Front -	<u>DOT-EL WA JKH 4002</u>

Tire has "DOT" markings: (X) YES () NO () UNDETERMINED

REMARKS:

RECORDED BY: M. D. [Signature]

DATE: 05/20/03

APPROVED BY: [Signature]

SECTION 4
INSTRUMENTATION AND EQUIPMENT LIST

TABLE 1 - INSTRUMENTATION & EQUIPMENT LIST

EQUIPMENT	DESCRIPTION	MODEL/ SERIAL NO.	CAL. DATE	NEXT CAL. DATE
PAD SCALES	#1 199744LF	199744LF	06/02	06/03
	#2 199744RF	199744RF	06/02	06/03
	#3 199744LR	199744LR	06/02	06/03
	#4 199744RR	199744RR	06/02	06/03
PRESSURE GAGE	WESKLER	0-100	05/03	05/04
SURFACE LEVEL	GTL	N/A	BEFORE USE	BEFORE USE

SECTION 5
PHOTOGRAPHS

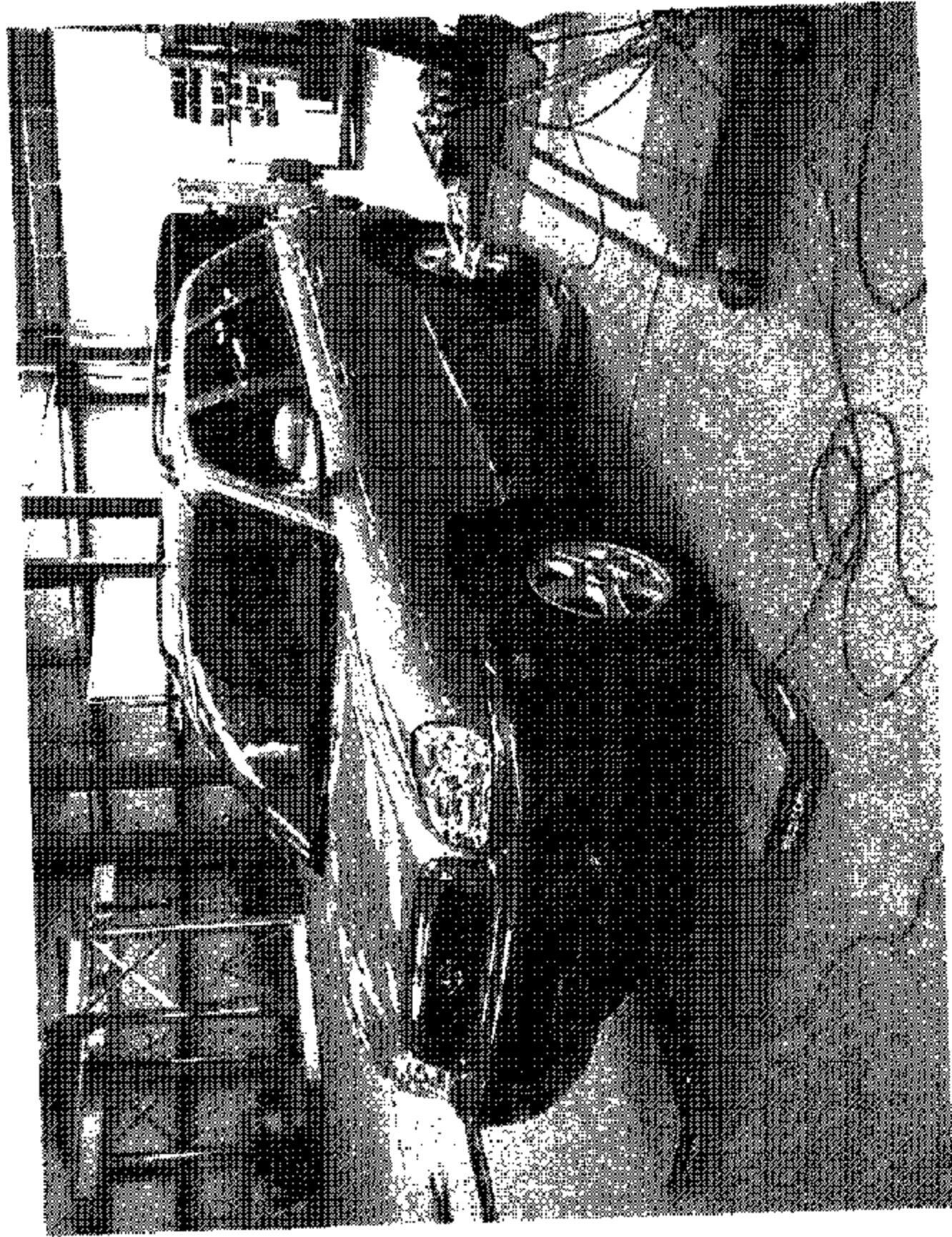


FIGURE 5.1
¾ FRONTAL VIEW OF VEHICLE

2003 HYUNDAI SANTA FE
NHTSA NO. C30508
FMVSS NO. 110 (INDICANT)



 MANUFACTURED IN KOREA BY
HYUNDAI MOTOR COMP.
NOV/2002 **GWR 4870 LBS** **PAH**
WGT 2645 LBS **WGT 2865 LBS** **TRM**
 ALL WEIGHTS CONFORM TO ALL APPLICABLE U.S.A. 100
 LBS WEIGHTS WITH NO BUILT IN TOLERANCE STANDARDS
 IN EXCESS OF 1% OF THE MANUFACTURING TOLERANCE
V.I.I. 10639128830411971
NPV

FIGURE 5.2
 VEHICLE CERTIFICATION LABEL

2003 HYUNDAI SANTA FE
 NHTSA NO. C30508
 FMVSS NO. 110 (INDICANT)

5

TIRE INFLATION PRESSURE

La Pression De Gonflage Des Pneus

VEHICLE CAPACITY WEIGHT, 4004kg(8805LB)

Poids en lb de la capacité du véhicule, 8805 (4004 kg)

SEATING CAPACITY TOTAL 5 FRONT 2 REAR 3

Capacité de transport total 5, 2 à l'avant

3 à l'arrière

TIRE PRESSURES COLD KPA(PSI)

Pression de gonflage à froid KPa(Psi)

TIRE SIZE Dimension du pneu	UP TO 2 PASSENGERS Jusqu'à 2 Personnes		UP TO 4 PASSENGERS Jusqu'à 4 Personnes		UP TO 4 PASSENGERS Jusqu'à 4 Personnes	
	FRONT Avant		FRONT Avant		FRONT Avant	
	REAR Arrière		REAR Arrière		REAR Arrière	
P205/65R16	200 KPa(29 PSI)		200 KPa(29 PSI)		200 KPa(29 PSI)	
P225/55R17	220 KPa(32 PSI)		220 KPa(32 PSI)		220 KPa(32 PSI)	

2003 HYUNDAI SANTA FE
NHTSA NO. C30508
FMVSS NO. 110 (INDICANT)

FIGURE 5.3
VEHICLE'S TIRE INFORMATION LABEL



FIGURE 5.4
TIRE SHOWING BRAND AND MODEL

2003 HYUNDAI SANTA FE
NHTSA NO. C30508
FMVSS NO. 110 (INDICANT)

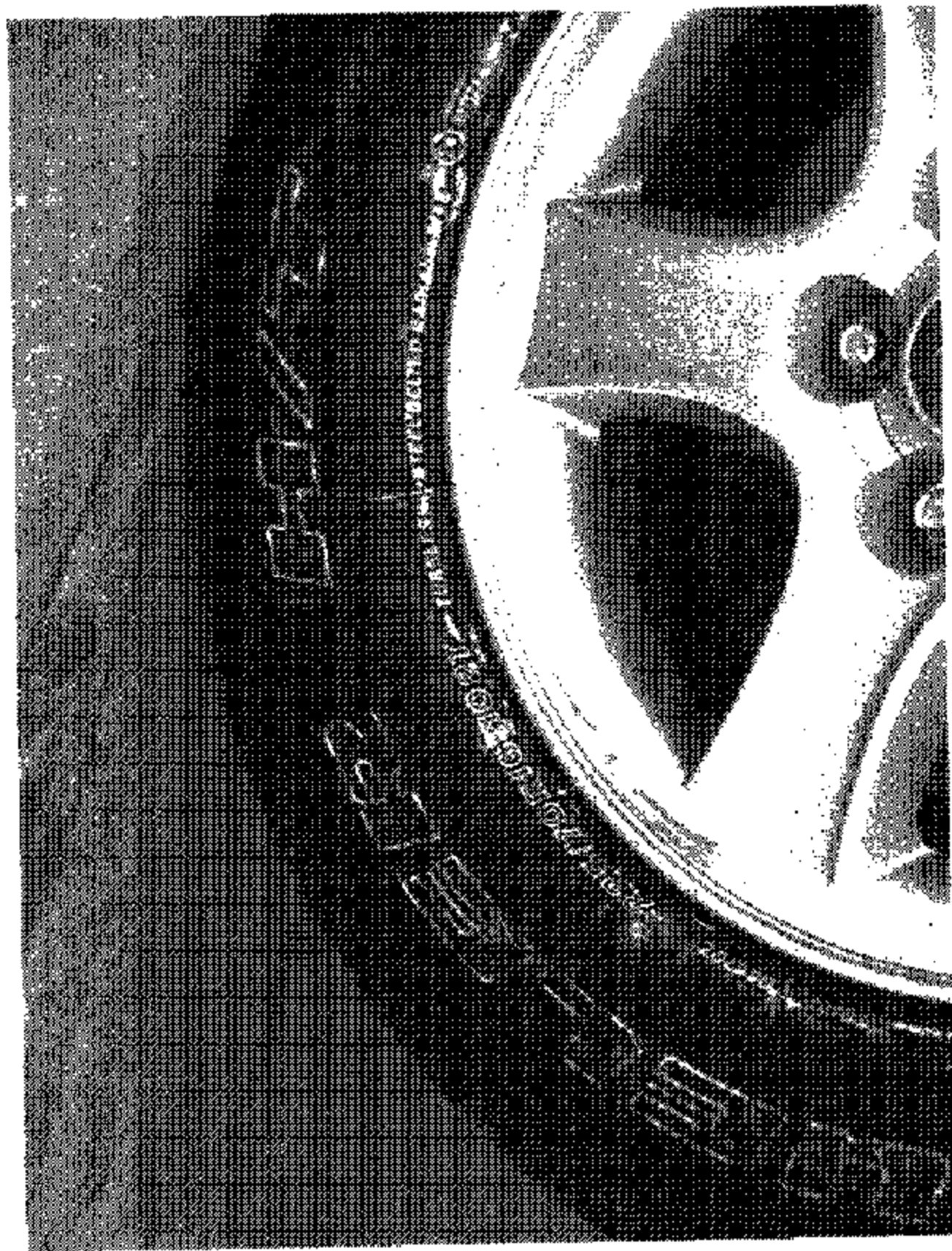


FIGURE 5.5

TIRE SHOWING SIZE, LOAD INDEX AND SPEED SYMBOL

2003 HYUNDAI SANTA FE
NHTSA NO. C30508
FMVSS NO. 110 (INDICANT)

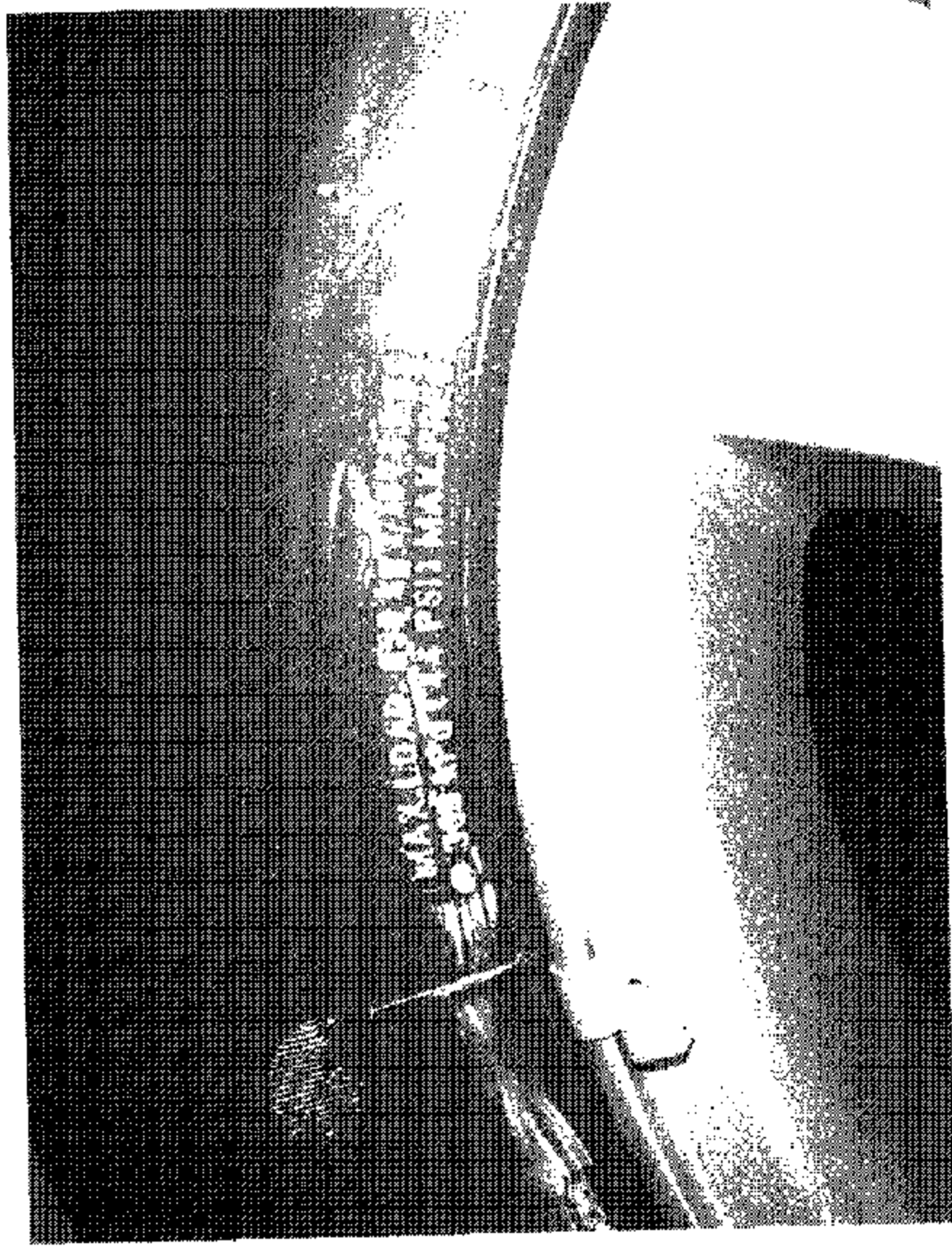


FIGURE 5.8
TIRE SHOWING MAX LOAD RATING AND MAX
INFLATION PRESSURE

2003 HYUNDAI SANTA FE
NHTSA NO. C30508
FMVSS NO. 110 (INDICANT)

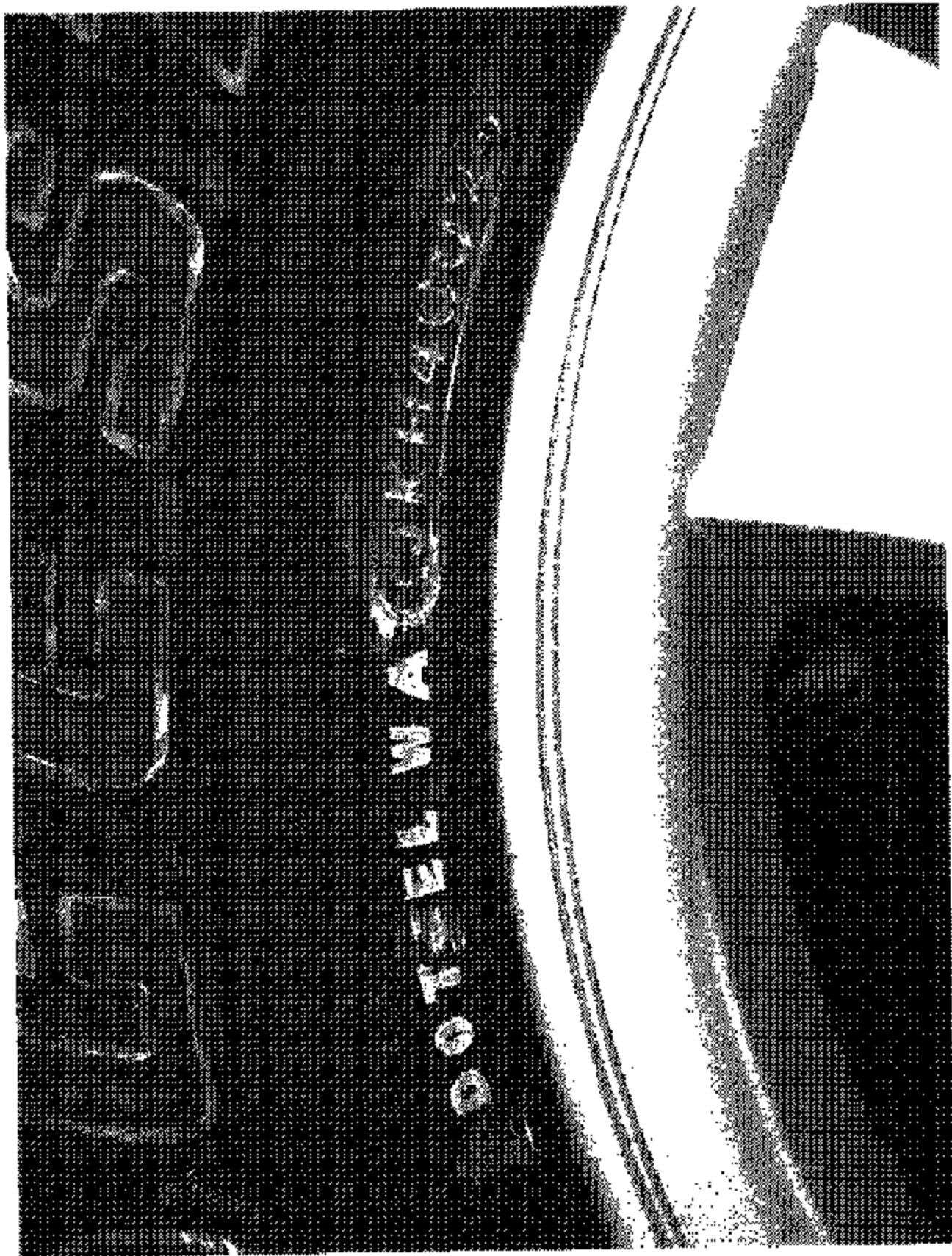


FIGURE 5.7
TIRE SHOWING SERIAL NUMBER

2003 HYUNDAI SANTA FE
NHTSA NO. C30508
FMVSS NO. 110 (INDICANT)

APPENDIX

Table 1 – Occupant Loading and Distribution for Vehicle Normal Load for Various Designated Seating Capacities

Designated Seating Capacities, numbers of Occupants	Vehicle normal load, number of occupants	Occupant distribution in a normally loaded vehicle
2 through 4	2	2 in front
5 through 10	3	2 in front, 1 in second seat
11 through 15	5	2 in front, 1 in second seat, 1 in third seat, 1 in fourth seat
16 through 22	7	2 in front, 2 in second seat, 2 in third seat, 1 in fourth seat

NOTE: For the indicant test each seat was adjusted to its full down and mid forward to aft position with the seat back adjusted to a 25° reclined angle. Each designated seat position was ballasted with 54 KG (120 LBS) in the seat and 14 KG (30 LBS) on the floor directly in front of the respective seat position.