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.
1623 LEEDSTOWN ROAD
COLONIAL BEACH, VIRGINIA 22443

SEPTEMBER 03, 2003
FINAL REPORT

PREPARED FOR

U.S. DEPARTMENT OF TRANSPORTATION
NATIONAL HIGHWAY TRAFFIC SAFETY ADMINISTRATION
SAFETY ENFORCEMENT
OFFICE OF VEHICLE SAFETY COMPLIANCE
400 SEVENTH STREET, SW
ROOM 6111 (NVS-220)
WASHINGTON, D.C. 20590
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   NHTSA No. C30508

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    Washington, DC 20590

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    Final Test Report
    May 20, 2003

    NVS-120 & NVS 220

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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</tbody>
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5.1 % Blank View of Vehicle  
5.2 Vehicle's Certification Label  
5.3 Vehicle's Tire Information Label  
5.4 Tire Showing Brand and Model  
5.5 Tire Showing Size, Load Index and Speed Symbol  
5.6 Tire Showing Max Load Rating and Max Inflation Pressure  
5.7 Tire Showing Serial Number

APPENDIX – Normal Load Occupation Distribution
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
### SUMMARY

**VEHICLE MAKE/MODEL/BODY STYLE:** 2003 HYUNDAI SANTA FE MPV  
**VEHICLE NHTSA NO.:** C30506  
**VIN:** KM8SB12B83U411971  
**LABORATORY:** GENERAL TESTING LABORATORIES  
**TEST DATE:** 05/20/03

<table>
<thead>
<tr>
<th>REQUIREMENT</th>
<th>YES/NO</th>
</tr>
</thead>
<tbody>
<tr>
<td>The vehicle is equipped with tires that meet the requirements of FMVSS 109 or FMVSS 119.</td>
<td>YES</td>
</tr>
<tr>
<td>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.</td>
<td>YES</td>
</tr>
<tr>
<td>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).</td>
<td>N/A</td>
</tr>
<tr>
<td>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).</td>
<td>YES</td>
</tr>
</tbody>
</table>

### REMARKS:

- [Add any additional remarks or notes here.]

**RECORDED BY:** [Signature]  
**DATE:** 05/20/03

**APPROVED BY:** [Signature]
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: KMB881283U411971  VEHICLE TYPE: MPV

GVWR 2209 kg (4870 lbs)  GAWR(Fr) 1200 kg (2645 lbs)  GAWR(Rr) 1900 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  ___ Manual  5 No. of Speeds

FINAL DRIVE DATA:  ___ Rear Drive  ___ 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:

<table>
<thead>
<tr>
<th>X</th>
<th>Air Conditioning</th>
<th>Traction Control</th>
<th>X</th>
<th>Clock</th>
</tr>
</thead>
<tbody>
<tr>
<td>X</td>
<td>Tinted Glass</td>
<td>All Wheel Drive</td>
<td>X</td>
<td>Roof Rack</td>
</tr>
<tr>
<td>X</td>
<td>Power Steering</td>
<td>X Cruise Control</td>
<td>X</td>
<td>Console</td>
</tr>
<tr>
<td>X</td>
<td>Power Windows</td>
<td>X Rear Window Defroster</td>
<td>X</td>
<td>Driver Air Bag</td>
</tr>
<tr>
<td>X</td>
<td>Power Door Locks</td>
<td>Sun Roof or T-Top</td>
<td>X</td>
<td>Passenger Air Bag</td>
</tr>
<tr>
<td></td>
<td>Power Seat(s)</td>
<td>X Tachometer</td>
<td>X</td>
<td>Front Disc Brakes</td>
</tr>
<tr>
<td>X</td>
<td>Power Brakes</td>
<td>X Tilt Steering Wheel</td>
<td>X</td>
<td>Rear Disc Brakes</td>
</tr>
<tr>
<td></td>
<td>Antilock Brake System</td>
<td>X AM/FM/CD</td>
<td></td>
<td>Other -</td>
</tr>
</tbody>
</table>

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

REMARKS:

RECORDED BY: [Signature]  DATE: 05/20/03

APPROVED BY: [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

<p>| | |</p>
<table>
<thead>
<tr>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>LF</td>
<td>492 KG (1084 LB)</td>
</tr>
<tr>
<td></td>
<td></td>
</tr>
<tr>
<td>RF</td>
<td>479 KG (1056 LB)</td>
</tr>
<tr>
<td></td>
<td></td>
</tr>
<tr>
<td>LR</td>
<td>334 KG (737 LB)</td>
</tr>
<tr>
<td></td>
<td></td>
</tr>
<tr>
<td>RR</td>
<td>350 KG (772 LB)</td>
</tr>
<tr>
<td>Front Axle</td>
<td>971 KG (2140 LB)</td>
</tr>
<tr>
<td>Rear Axle</td>
<td>684 KG (1509LB)</td>
</tr>
<tr>
<td>Total Vehicle</td>
<td>1655 KG (3649 LB)</td>
</tr>
</tbody>
</table>

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

<table>
<thead>
<tr>
<th></th>
<th>Front</th>
<th>Rear</th>
</tr>
</thead>
<tbody>
<tr>
<td>(a) Installed Tire Size</td>
<td>P225/70R16</td>
<td>P225/70R16</td>
</tr>
<tr>
<td>Max. Load Rating on Sidewall</td>
<td>850 KG (1874 LBS)</td>
<td>850 KG (1874 LBS)</td>
</tr>
<tr>
<td>Reduced Sidewall Load Rating (if applicable)*</td>
<td>773 KG (1704 LBS)</td>
<td>773 KG (1704 LBS)</td>
</tr>
<tr>
<td>High Speed Test Load (88% of sidewall max. load rating)</td>
<td>660 KG (1500 LBS)</td>
<td>660 KG (1500 LBS)</td>
</tr>
<tr>
<td>(b) Optional Tire Size(s)</td>
<td>NONE</td>
<td>NONE</td>
</tr>
</tbody>
</table>

* 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: [Signature]  DATE: 05/20/03

APPROVED BY: [Signature]
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 (X) No
Is Label Permanently Affixed: ( ) Yes ( ) No
Label Location: _____________________________________________
Description of Label: _______________________________________

Vehicle has a separate Tire Information Label or Placard (X) Yes ( ) No
Is Label Permanently Affixed: (X) Yes ( ) No
Label Location: Bottom of Driver's Side Door Jam at "B" Pilar
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 (X) Yes ( ) No
(2) Terms of Occupants for Each Seat Location (X) 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: ___________________________ DATE: 05/20/03

APPROVED BY: ___________________________
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: P225/70R16

Tire Load Index/Speed Symbol: 102T

Maximum Inflation Pressure: 300 kPa (44 psi)

Maximum Load Rating: 850 KG (1874 LBS.)

Mfr. Name or Brand & Code: BRIDGESTONE

Tube or Tubeless: TUBELESS

Treadwear/Traction/Temp. Grades: 300/B/B

Sidewall (Plies & Composition): 2 PLY POLYESTER

Tread (Plies & Composition): 2 PLY POLYESTER

                               2 PLY STEEL

                               1 PLY NYLON

Serial Number: Right Front - DOT-EL WA JKH 4002

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

REMARKS:

RECORDED BY: [Signature] DATE: 05/20/03

APPROVED BY: [Signature]
# SECTION 4
INSTRUMENTATION AND EQUIPMENT LIST

<table>
<thead>
<tr>
<th>EQUIPMENT</th>
<th>DESCRIPTION</th>
<th>MODEL/ SERIAL NO.</th>
<th>CAL. DATE</th>
<th>NEXT CAL. DATE</th>
</tr>
</thead>
<tbody>
<tr>
<td>PAD SCALES</td>
<td>#1 199744LF</td>
<td>199744LF</td>
<td>06/02</td>
<td>06/03</td>
</tr>
<tr>
<td></td>
<td>#2 199744RF</td>
<td>199744RF</td>
<td>06/02</td>
<td>06/03</td>
</tr>
<tr>
<td></td>
<td>#3 199744LR</td>
<td>199744LR</td>
<td>06/02</td>
<td>06/03</td>
</tr>
<tr>
<td></td>
<td>#4 199744RR</td>
<td>19974RR</td>
<td>06/02</td>
<td>06/03</td>
</tr>
<tr>
<td>PRESSURE GAGE</td>
<td>WESKLER</td>
<td>0-100</td>
<td>05/03</td>
<td>05/04</td>
</tr>
<tr>
<td>SURFACE LEVEL</td>
<td>GTL</td>
<td>N/A</td>
<td>BEFORE USE</td>
<td>BEFORE USE</td>
</tr>
</tbody>
</table>
SECTION 5
PHOTOGRAPHS
2003 HYUNDAI SANTA FE
NHTSA NO. C30509
FMVSS NO. 110 (INDICANT)

FIGURE 5.1
3/4 FRONTAL VIEW OF VEHICLE
Figure 5.2
Vehicle Certification Label

2003 Hyundai Santa Fe
NHTSA No. C30508
FMVSS No. 110 (Indicant)
<table>
<thead>
<tr>
<th>TIRE SIZE</th>
<th>FRONT R</th>
<th>FRONT L</th>
<th>REAR R</th>
<th>REAR L</th>
</tr>
</thead>
<tbody>
<tr>
<td>Dims (in.)</td>
<td>265/70R17</td>
<td>265/70R17</td>
<td>265/70R17</td>
<td>265/70R17</td>
</tr>
<tr>
<td>Load (lbs)</td>
<td>3400</td>
<td>3400</td>
<td>3400</td>
<td>3400</td>
</tr>
</tbody>
</table>

VEHICLE CAPACITY: 4000kg (8800lbs)
Poids en lb de la capacite du vehicule: 4000 (8800 lbs)
SEATING CAPACITY: TOTAL 5, FRONT 2, REAR 3
Capacite de transport total: 5, 2 a l'avant, 3 a l'arriere.

FIGURE 5.3
VEHICLE'S TIRE INFORMATION LABEL
Table 1 – Occupant Loading and Distribution for Vehicle Normal Load for Various Designated Seating Capacities

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

NOTE: For the indicate 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.