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

TOYOTA MOTOR CORPORATION
2003 TOYOTA HIGHLANDER, MPV
NHTSA NO. C35103

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

SEPTEMBER 9, 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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May 23, 2003

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16. Abstract
This test was conducted on the subject, 2003 Toyota Highlander 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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**APPENDIX** – Normal Load Occupation Distribution
SECTION 1

INTRODUCTION

1.0 PURPOSE OF INDICANT TEST

A 2003 Toyota Highlander 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 Toyota Highlander MPV. Nomenclature applicable to the test vehicle are:

A. Vehicle Identification Number: JTEGD21A530058515

B. NHTSA No.: C35103

C. Manufacturer: TOYOTA MOTOR CORPORATION

D. Manufacture Date: 01/03

1.2 TEST DATE

The test vehicle was subjected to testing on May 23, 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 Toyota Highlander 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
VEHICLE MAKE/MODEL/BODY STYLE: 2003 TOYOTA HIGHLANDER MPV  
VEHICLE NHTSA NO.: C35103; VIN: 2JTGD21A530058515 
LABORATORY: GENERAL TESTING LABORATORIES  
TEST DATE: 05/23/03

---

REQUIREMENT

THE VEHICLE IS EQUIPPED WITH TIRES THAT MEET THE REQUIREMENTS OF FMVSS 109 OR FMVSS 119.

YES

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.

YES

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).

N/A

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).

YES

---

REMARKS:

---

RECORDED BY: [Signature]  DATE: 05/23/03

APPROVED BY: [Signature]
DATA SHEET 2
TEST VEHICLE INFORMATION/RECEIVING INSPECTION

LABORATORY: GENERAL TESTING LABORATORIES  DATE: 05/23/03

VEHICLE MODEL YEAR/MAKE/MODEL/BODY STYLE: 2003 TOYOTA HIGHLANDER MPV

MANUFACTURE DATE: 01/03  NHTSA NO.: C36103  BODY COLOR: MILLENIUM SILVER

VIN: JTEGD21A63058515  VEHICLE TYPE: MPV

GVWR 2260 kg (4985 lbs)  GAWR(Fr) 1300 kg (2865 lbs)  GAWR(Rr) 1240 kg (2735 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: X Automatic  Manual  4 No. of Speeds

FINAL DRIVE DATA: 4 Wheel Drive

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

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

| X | Air Conditioning | Traction Control | Clock |
| X | Tinted Glass | All Wheel Drive | Roof Rack |
| X | Power Steering | X Cruise Control | Conso-e |
| X | Power Windows | X Rear Window Defroster | X Driver Air Bag |
| X | Power Door Locks | Sun Roof or T-Top | X Passenger Air Bag |
| X | Power Seat(s) | X Tachometer | X Front Disc Brakes |
| X | Power Brakes | X Tilt Steering Wheel | X Rear Disc Brakes |
| X | Antilock Brake System | X AM/FM/CD | Other - |

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

REMARKS:

RECORDED BY:  DATE: 05/23/03

APPROVED BY:
DATA SHEET 3
CURB WEIGHT WITH OPTIONS AND NORMAL LOAD

VEHICLE MAKE/MODEL/BODY STYLE: 2003 TOYOTA HIGHLANDER MPV
VEHICLE NHTSA NO.: C35103 ; VIN: JTEGD21A530058515
LABORATORY: GENERAL TESTING LABORATORIES
TEST DATE: 05/23/03

Full Fluid Levels:
Fuel Full; Coolant Full; Other Fluids Full

Tire Pressure:
LF......... 210 KPA (30 psi)  LR......... 210 KPA (30 psi)
RF......... 210 KPA (30 psi)  RR......... 210 KPA (30 psi)

A. MEASURED CURB WEIGHT WITH INSTALLED OPTIONS AND ACCESSORIES

<table>
<thead>
<tr>
<th></th>
<th>455 KG (1003 LB)</th>
<th>342 KG (753 LB)</th>
</tr>
</thead>
<tbody>
<tr>
<td>LF</td>
<td>455 KG (1003 LB)</td>
<td>342 KG (753 LB)</td>
</tr>
<tr>
<td>RF</td>
<td>450 KG (992 LB)</td>
<td>334 KG (737 LB)</td>
</tr>
</tbody>
</table>

Front Axle 905 KG (1995 LB)  Rear Axle 676 KG (1490LB)

Total Vehicle 1581 KG (3485 LB)

B. MEASUREVE 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)

<table>
<thead>
<tr>
<th></th>
<th>503 KG (1108 LB)</th>
<th>394 KG (869 LB)</th>
</tr>
</thead>
<tbody>
<tr>
<td>LF</td>
<td>503 KG (1108 LB)</td>
<td>394 KG (869 LB)</td>
</tr>
<tr>
<td>RF</td>
<td>499 KG (1099 LB)</td>
<td>390 KG (859 LB)</td>
</tr>
</tbody>
</table>

Frt Axle 1002 KG (2207 LB)  Rr Axle 784 KG (1728LB)

Total Vehicle 1785 KG (3935 LB)
DATA SHEET 3 – CONTINUED

(5) Calculated Vehicle Normal Load on the Tire
    Front Tires (measured front axle normal load/2) = 501 KG (1104 LB)
    Rear Tires (measured front axle normal load/2) = 392 KG (864 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>825 KG(1819 LBS)</td>
<td>825 KG(1819 LBS)</td>
</tr>
<tr>
<td>Reduced Sidewall Load Rating (if applicable)*</td>
<td>750 KG(1654 LBS)</td>
<td>750 KG(1654 LBS)</td>
</tr>
<tr>
<td>High Speed Test Load (88% of sidewall max. load rating)</td>
<td>660 KG(1456 LBS)</td>
<td>660 KG(1456 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.
DATA SHEET 4
TIRE INFORMATION LABEL OR PLACARD

VEHICLE MAKE/MODEL/BODY STYLE: 2003 TOYOTA HIGHLANDER MPV
VEHICLE NHTSA NO.: C35103 ; VIN: 3TGF21A530585515
LABORATORY: GENERAL TESTING LABORATORIES
TEST DATE: 05/23/03

A. Vehicle Type from Certification Label: MPV

B. Identify Vehicle Labeling:

Vehicle has a combined Certification Tire Information Label (X) Yes ( ) No
Is Label Permanently Affixed: (X) Yes ( ) No
Label Location: Driver's Side Lower "B" Pillar
Description of Label: Black/White Sticker

Vehicle has a separate Tire Information Label or Placard (X) Yes ( ) No
Is Label Permanently Affixed: (X) Yes ( ) No
Label Location: Driver's Side Lower "B" Pillar
Description of Label: Black/White Sticker

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

Vehicle Capacity Weight: 420 KG (925 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 - 210 kPa (30 psi)
REAR - 210 kPa (30 psi)

Manufacturer's Recommended Tire Size(s) and Cold Tire Inflation Pressure(s) for Other Load Conditions: None

REMARKS: The Highlander 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: 05/23/03
APPROVED BY:
DATA SHEET 5
VEHICLE TIRE DATA

VEHICLE MAKE/MODEL/BODY STYLE: 2003 TOYOTA HIGHLANDER MPV
VEHICLE NHTSA NO.: C35103
VIN: JTEGD21A530058515
LABORATORY: GENERAL TESTING LABORATORIES
TEST DATE: 05/23/03

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
101S

Maximum Inflation Pressure
300 kPa (44 psi)

Maximum Load Rating
825 KG (1819 LBS)

Mfr. Name or Brand & Code
GOODYEAR INTEGRITY

Tube or Tubeless
TUBELESS

Treadwear/Traction/Temp. Grades
460/A/B

Sidewall (Plies & Composition)
2 PLY POLYESTER

Tread (Plies & Composition)
2 PLY STEEL

Serial Number: Right Front - DOT-M65L B3DR 4102

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

REMARKS:

RECORDED BY: [Signature]
DATE: 05/23/03

APPROVED BY: [Signature]
### TABLE 1 - INSTRUMENTATION & 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>199744RR</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
APPENDIX

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 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.