REPORT NUMBER 110-GTL-08-005

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

TOYOTA MOTOR MANUFACTURING, TEXAS, INC.
2008 TOYOTA TUNDRA, TRUCK
NHTSA NO. C85108

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

SEPTEMBER 15, 2008

FINAL REPORT

PREPARED FOR

U. S. DEPARTMENT OF TRANSPORTATION
NATIONAL HIGHWAY TRAFFIC SAFETY ADMINISTRATION
ENFORCEMENT
OFFICE OF VEHICLE SAFETY COMPLIANCE
1200 NEW JERSEY AVE., SE
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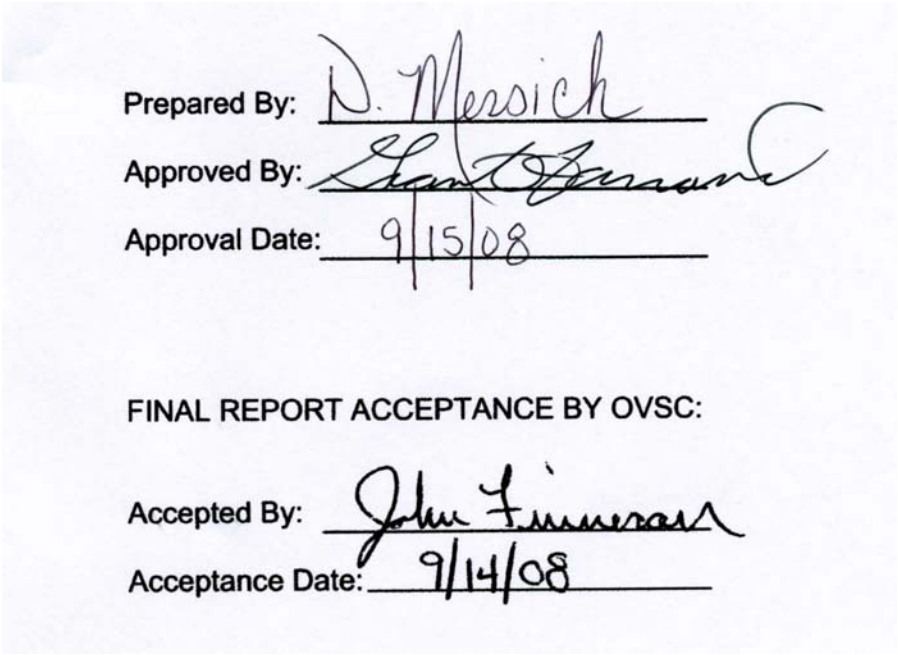

Technical Report Documentation Page

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7. Author(s) Grant Farrand, Project Engineer Debbie Messick, Project Manager		8. Performing Organ. Rep# GTL-DOT-08-110-005
9. Performing Organization Name and Address General Testing Laboratories, Inc. 1623 Leedstown Road Colonial Beach, Va 22443		10. Work Unit No. (TRAIS) N/A 11. Contract or Grant No. DTNH22-06-C-00032
12. Sponsoring Agency Name and Address U.S. Department of Transportation National Highway Traffic Safety Admin. Enforcement Office of Vehicle Safety Compliance (NVS-220) 1200 New Jersey Ave., S.E., Washington, DC 20590		13. Type of Report and Period Covered Final Test Report July 28 - 29, 2008 14. Sponsoring Agency Code NVS-221
15. Supplementary Notes		
16. Abstract Compliance tests were conducted on the subject 2008 Toyota Tundra, Truck in accordance with the specifications of the Office of Vehicle Safety Compliance Test Procedure No. TP-110T-02 for the determination of FMVSS 110 compliance. Test failures identified were as follows: None		
17. Key Words Compliance Testing Safety Engineering FMVSS 110	18. Distribution Statement Copies of this report are available from NHTSA Technical Information Services (TIS) Room W45-212 (NPO-411) 1200 New Jersey Ave., S.E. Washington, DC 20590 Telephone No. (202) 366-4947	
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SECTION 1

INTRODUCTION

1.0 PURPOSE OF COMPLIANCE TEST

A 2008 Toyota Tundra Truck was subjected to FMVSS No. 110 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-110T-02 dated 31 August 2007 and General Testing Laboratories, Inc (GTL) Test Procedure, TP-110T dated 11 June 2007.

1.1 TEST VEHICLE

The test vehicle was a 2008 Toyota Tundra Truck. Nomenclature applicable to the test vehicle are:

A. Vehicle Identification Number: 5TFRV54188X045778

B. NHTSA No.: C85108

C. Manufacturer: TOYOTA MOTOR MANUFACTURING, TEXAS, INC.

D. Manufacture Date: 12/07

1.2 TEST DATE

The test vehicle was subjected to FMVSS No. 110 testing during the time period July 28-29, 2008.

SECTION 2

TEST PROCEDURE AND SUMMARY OF RESULTS

2.0 GENERAL

The 2008 Toyota Tundra Truck, NHTSA No. C85108, was subjected to FMVSS No. 110 testing during the time period July 28 through July 29, 2008.

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. The vehicle was then photographically documented as required by the DOT/NHTSA and GTL test procedures. Subsequent events included weighing the vehicle to establish delivered curb weight and the distribution of weight on the front and rear axles and each wheel position. The vehicle normal load as well as the maximum load on each wheel were measured. Data from each tire furnished with the vehicle were recorded. The vehicle tire placard was surveyed and photographed. Required dimensional data and other identifying data for the left front and right rear rims were obtained. The contour of the aforementioned rims was documented photographically.

In preparation for the deflated tire retention test, test instrumentation was installed in the vehicle. With the driver aboard, the vehicle was ballasted to equal the “vehicle maximum load on the tire” on the front and rear axle, as previously established. The tire pressure of all tires was adjusted to placard specifications for cold tire inflation at maximum loaded vehicle weight. The deflated tire retention test was then conducted on the left front tire followed by the right rear tire. The tests were conducted with the vehicle traveling in a straight line at 96.6 kph (60 mph). The respective tire was blown by an explosive charge on the tire’s sidewall. Test data collected during the test included vehicle speed, deceleration, stopping distance, distance of uncontrolled deviation from a straight line and tire pressure. After the vehicle was stopped, any tire bead separation from the rim flange was documented photographically.

2.2 SUMMARY OF RESULTS

The test vehicle appears to be in compliance with the requirements of FMVSS No. 110.

SECTION 3

TEST DATA

DATA SHEET 1 (1 of 2)
SUMMARY

VEHICLE MAKE/MODEL/BODY STYLE: 2008 TOYOTA TUNDRA
VEHICLE NHTSA NO.: C85108 ; VIN: 5TFRV54188X045778
VEHICLE TYPE: TRUCK DATE OF MANUFACTURE: 12/07
LABORATORY: General Testing Laboratories, Inc.
TEST DATE: July 28-29, 2008

LIGHT TRUCK TYPE VEHICLE REQUIREMENTS	PASS/FAIL
General (Data Sheet 2)	
The vehicle is equipped with tires that meet the requirements of S139. (S110, S4.1)	Pass
Tire Load Limits (Data Sheet 2)	
The sum of the maximum load ratings of the tires fitted to an axle is not less than the gross axle weight rating (GAWR) of the axle system as specified on the certification label. When passenger car tires are installed, each tires load rating is reduced by dividing it by 1.10 before determining the sum of the maximum load ratings of the tires fitted to an axle. (S110, S4.2.2.1, S4.2.2.2)	Pass
When passenger car tires are installed, the vehicle normal load on the tire is not greater than the value of 94 percent of the derated load rating at the vehicle manufacturer's recommended cold inflation pressure for that tire. When LT tires are installed, the vehicle normal load on the tire is not greater than the value of 94 percent of the load rating at the vehicle manufacturer's recommended cold inflation pressure for that tire. (S110, S4.2.2.3(a), (b))	Pass
Rims (Data Sheet 3 and 6)	
Each rim is constructed to the dimensions of a rim referred to in FMVSS 139 that is listed by the manufacturer of the tires as suitable for use with those tires. (S110, S4.4.1 (a))	Pass
Vehicle rims retain deflated tires during a controlled braking application (S110, S4.4.1(b))	Pass
Each rim is properly marked (S110, S4.4.2)	Pass

DATA SHEET 1 (2 of 2)
SUMMARY

LIGHT TRUCK TYPE VEHICLE REQUIREMENTS	PASS/FAIL

Certification, Placard, and Tire Inflation Pressure Labels (Data Sheet 4)

The placard and tire inflation pressure label (if provided) are affixed and located correctly, and display the information and format required (S110, S4.3) Pass

The Part 567 certification label shows the size designation of the tires and rims appropriate for the vehicle including the tire size(s) listed on the vehicle placard and, if provided, tire inflation pressure label. S110, S4.3.3) Pass

No inflation pressure other than the maximum permissible inflation pressure is shown on the placard and, if any, tire inflation pressure label unless as required. (S110, S4.3.4) Pass

Vehicle Weight Distribution (Data Sheet 5)

The Gross Vehicle Weight Rating(GVWR) is not less than the sum of the unloaded vehicle weight, rated cargo load, and 68 kg times the vehicle's designated seating capacity. However, for school buses, the minimum occupant weight allowance is 54 kg. (49 CFR 567, Certification) Pass

Owner's Manual (Data Sheet 6)

Owner's manual or other document has discussion of Vehicle Placard, Loading and Tires. (575.6 (a) (4)) Pass

Owner's manual includes exact statement relating to "Steps for Determining Correct Load Limits." (575.6 (a)(5)) Pass

RECORDED BY: G. FARRAND DATE: 07/29/08
APPROVED BY: D. MESSICK

DATA SHEET 2
TEST VEHICLE INFORMATION

LABORATORY: General Testing Laboratories, Inc. DATE: 07/28/08

VEHICLE MODEL YEAR/MAKE/MODEL/BODY STYLE: 2008 TOYOTA TUNDRA

MANUFACTURE DATE: 12/07 NHTSA NO.: C85108 BODY COLOR: Silver

VIN: 5TFRV54188X045778 VEHICLE TYPE: TRUCK

GVWR 3125 kg (6900 lbs) GAWR(Fr) 1765 kg (3900 lbs) GAWR(Rr) 1855 kg (4100 lbs)

SEATING POSITIONS: FRONT 3 MID ____ REAR 3

ODOMETER READING AT START OF TEST: 12 Miles

ENGINE DATA: 8 Cylinders 5.7 Liters ____ Cubic Inches

TRANSMISSION DATA: X Automatic ____ Manual 6 No. of Speeds

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

CHECK APPROPRIATE BOXES FOR VEHICLE EQUIPMENT/MAKE SURE ALL OPTIONS ON WINDOW

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

REMARKS:

RECORDED BY: G. FARRAND DATE: 07/28/08
APPROVED BY: D. MESSICK

DATA SHEET 3
TEST VEHICLE TIRE IDENTIFICATION AND LOAD LIMITS

VEHICLE MAKE/MODEL/BODY STYLE: 2008 TOYOTA TUNDRA
VEHICLE NHTSA NO.: C85108 ; VIN: 5TFRV54188X045778
LABORATORY: General Testing Laboratories, Inc.
TEST DATE: July 28, 2008

All tires on the vehicle (excluding the spare) are the same size: (X) Yes ( ) No

Spare tire is the same size as all other tires: (X) Yes ( ) No

Tire Sidewall	Right Front	Left Rear (If different)	Spare Tire (If different)
Manufacturer and Model	Michelin LTX A/S		Bridgestone Dueler HT
Tire Size Designation	P255/70R18		255/70R18
Load Index/Speed Symbol	112 T		112 T
Maximum Inflation Pressure	300 KPA, 44 PSI		300 KPA, 44 PSI
Maximum Load Rating	1120 KG, 2469 LBS		1120 KG, 2469 LBS
Treat/Traction/Temperature	420/A/B		360/B/B
Tires have “DOT” markings	YES		YES

Serial Number:
Right Front M3YUR9LX4007 Left Front M3YUR9LX4007
Right Rear M3YUR9LX4007 Left Rear M3YUR9LX4007
Spare 7X0P658

Mounted Tire vs. Axle Rating Comparison (at sidewall maximum inflation pressure)	Front Axle	Rear Axle
A. GAWR (KG) from certification label	1765 KG	1855 KG
B. Tire Maximum Load Rating from above (KG)	1120 KG	1120 KG
C. Reduced Tire Load Rating, if applicable (KG)*	1018 KG	1018 KG
D. (Number of tires on axle) x (tire load rating, de-rated if appropriate)	2036 KG	2036 KG
Is “D” equal to or greater than “A”? (Yes/No)	YES	YES

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

DATA INDICATES COMPLIANCE PASS/FAIL Pass

REMARKS:

RECORDED BY: G. FARRAND DATE: 07/28/08
APPROVED BY: D. MESSICK

DATA SHEET 4
VEHICLE RIM IDENTIFICATION

VEHICLE MAKE/MODEL/BODY STYLE: 2008 TOYOTA TUNDRA
VEHICLE NHTSA NO.: C85108 ; VIN: 5TFRV54188X045778
LABORATORY: General Testing Laboratories, Inc.
TEST DATE: July 28, 2008

RIM MARKINGS	RIGHT FRONT	LEFT REAR (if different)
A. Source of published dimensions (letter designation)	"J"	
B. Rim Size	18 x 8 J	
C. Does rim contain DOT symbol (Yes/No)	YES	
D. Manufacturer's name, symbol or trademark (copy format)	CMC	
E. Date of manufacture or symbol (copy format)	12 07	
Do items A-C appear on weather side of rim? (Yes/No)	YES	
Letter height (not less than 3 mm)	YES	
Lettering (impressed or embossed)	IMPRESSED	
Are all rim markings legible? (Yes/No)	YES	
Do all markings comply with requirements? (Yes/No)	YES	

RIM MEASUREMENTS	RIGHT FRONT	LEFT REAR (if different)
Rim Width (mm)	203.2	
Rim Diameter (mm)	457.2	
Rim measurements same as rim markings? (Yes/No)	YES	

Rims are suitable for tire on vehicle* (X) Yes ( ) No
*Reference source used for tire/rim match verification: 2008 Tire and Rim Association Yearbook

DATA INDICATES COMPLIANCE PASS/FAIL Pass

REMARKS:

RECORDED BY: G. FARRAND DATE: 07/28/08
APPROVED BY: D. MESSICK

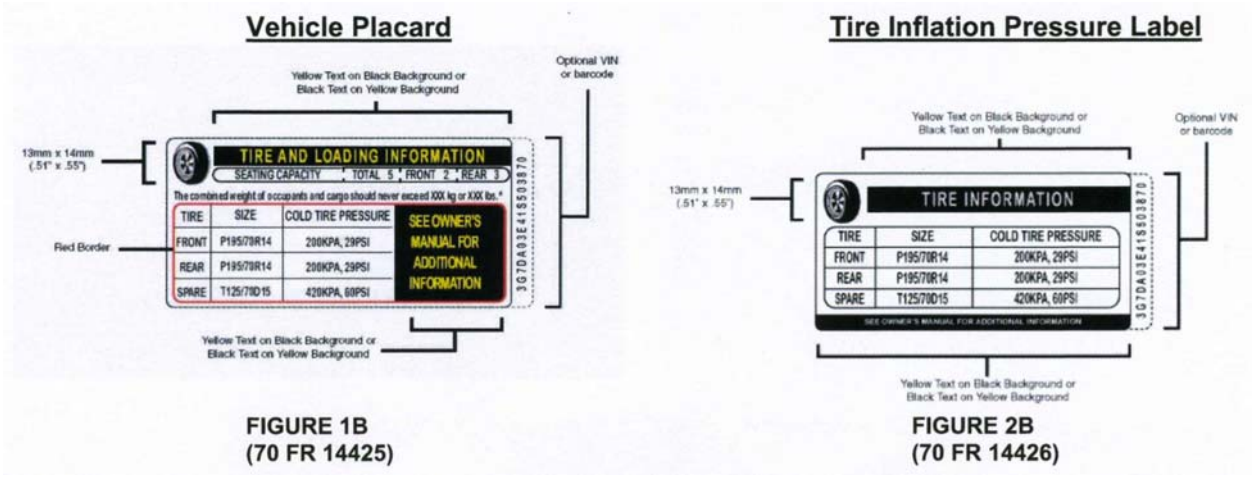
DATA SHEET 5 (1 of 3)
VEHICLE PLACARD AND TIRE INFLATION PRESSURE LABEL

VEHICLE MAKE/MODEL/BODY STYLE: 2008 TOYOTA TUNDRA
VEHICLE NHTSA NO.: C85108 ; VIN: 5TFRV54188X045778
LABORATORY: General Testing Laboratories, Inc.
TEST DATE: July 28, 2008

Identification of Vehicle Labeling

	(Yes/No)	Location	Pass/Fail
1. Certification Label*	Yes	Driver "B" Pillar	Pass
2. Vehicle Placard*	Yes	Driver "B" Pillar	Pass
3. Tire Inflation Pressure Label*	No	N/A	N/A

*Labels are to be located as specified in section 12.4 of DOT test procedure



Labeling Notes:
1. Tire size and pressure can be omitted from Vehicle Placard if same data is displayed on a Tire Inflation Pressure Label.
2. The Alphanumeric Identifier or Barcode, is optional. It can be located vertically, along the right edge or the left edge of the placard or label, or horizontally, along the bottom edge of the placard or label.
3. Tire size can include the tire load range identification symbol("XL" or "reinforced", "B", "C", "D", "E", or "F"), the load index number, and speed rating symbol, located immediately to the right of the tire size designation.
4. The tire "SIZE" heading can be replaced with "ORIGINAL TIRE SIZE" or "ORIGINAL SIZE"
5. The "SPARE" tire heading can be replaced with "SPARE TIRE."
6. For full size spare tires, the recommended cold tire inflation pressure can be replaced with "SEE ABOVE."
7. If no spare tire is provided, the word "NONE" is to replace the manufacturer's cold tire inflation pressure.

DATA SHEET 5 (2 of 3)
VEHICLE PLACARD AND TIRE INFLATION PRESSURE LABEL

Vehicle Placard has the exact color and format as specified in the above Figure 1B and text is in English. (X) Yes ( ) No
If no, explain:_____

Tire Inflation Pressure Label, if provided, has the exact color and format as specified in the above Figure 2B and text is in English. ( ) Yes ( ) No (X) Not Applicable
If no, explain:_____

Vehicle Placard and, if provided, **Tire Inflation Pressure Label** are permanently affixed.
(X) Yes ( ) No

Vehicle Placard information:

Combined weight of occupants and cargo 665 kg (1475 lbs)
Seating capacity: Total 6 Front 3 Rear 3
Is the number of belted seating positions the same as the labeled seating capacity?
(X) Yes ( ) No
If no, explain_____

Is the tire size and pressure provided? (X) Yes ( ) No
If no, is the tire size and pressure provided on a Tire Inflation Pressure Label?
( ) Yes ( ) No

Vehicle Placard or Tire Inflation Pressure Label tire information:

Tire size Front P255/70R18 Rear P255/70R18
Tire Inflation Pressure Front 30 psi Rear 33 psi
Are the sizes of the installed tires the same as the sizes of the labeled tires?
(X) Yes ( ) No
If no, explain_____

Is the labeled cold tire inflation pressure equal to or less than the sidewall labeled maximum cold tire inflation pressure?
Front axle: (X) Yes ( ) No Rear axle: (X) Yes ( ) No

Vehicle Certification Label information:

	Tire Size	Rim Size	Rim Suitable for Tire? (Yes/No)*
Front Axle	P255/70R18	18 x 8 J	Yes
Rear Axle	P255/65R18	18 x 8 J	Yes

DATA SHEET 5 (3 of 3)
VEHICLE PLACARD AND TIRE INFLATION PRESSURE LABEL

Referenced source used for tire/rim match verification: 2008 Tire and Rim Association Yearbook

Is (Are) tire size(s) listed on the vehicle placard and/or tire inflation pressure label also listed on the certification label with suitable rim size? (X) Yes ( ) No

Labeled Tire Capacity at Specified Pressure GVWR: 3125 KG	Front Axle	Rear Axle
A. GAWR (KG) from certification label	1765	1855
B. Tire Load Rating (KG) of labeled tire size at labeled inflation pressure*	1045	1095
C. Reduced Tire Load Rating, if applicable** (KG)	950	995
D. (Number of tires) x (tire load rating, de-rated if appropriate) (KG)	1900	1991
Is “D” equal to or greater than “A”? (Yes/No)	YES	YES

*Reference source used for tire/rim match verification: 2008 Tire and Rim Association Yearbook

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

DATA INDICATES COMPLIANCE PASS/FAIL Pass

REMARKS:

RECORDED BY: G. FARRAND DATE: 07/28/08
APPROVED BY: D. MESSICK

DATA SHEET 6 (1 of 4)
CURB WEIGHT, NORMAL LOAD WEIGHT & MAXIMUM VEHICLE WEIGHT

VEHICLE MAKE/MODEL/BODY STYLE: 2008 TOYOTA TUNDRA
VEHICLE NHTSA NO.: C85108 ; VIN: 5TFRV54188X045778
LABORATORY: General Testing Laboratories, Inc.
TEST DATE: July 29, 2008

Full Fluid Levels: Fuel Full Coolant Full Other Fluids Full (Brake Fluid, Windshield Washer Fluid)

Tire Pressures: LF 210 KPA LR 230 KPA
RF 210 KPA RR 230 KPA

A. MEASURED CURB WEIGHT WITH INSTALLED OPTIONS AND ACCESSORIES

LF 669.5 KG LR 530.0 KG
RF 699.5 KG RR 518.0 KG

Front Axle 1369.0 KG Rear Axle 1048.0 KG

Total Vehicle 2417.0 KG

B. MEASURED VEHICLE NORMAL LOAD WEIGHT

1. Seating Capacity from Vehicle Placard 6
2. Normal Load Number of Occupants(from table in Section 10) 3
   Occupant Distribution: Front Seat 2 Second Seat 1
   Third Seat 0 Fourth Seat 0
3. Total Normal Occupant Load 204 KG
   (# of occupants x 68 KG per occupant)
4. Measured Normal Load on Axles
   LF 731.0 KG LR 572.5 KG
   RF 759.5 KG RR 558.0 KG

   Front Axle 1490.5 KG Rear Axle 1130.5 KG

   Total Vehicle 2621.0 KG

5. Calculated Vehicle Normal Load on the Tire
   Front Tires (Measured front axle normal load/2) 745.3 KG
   Rear Tires (Measured rear axle normal load/2) 565.3 KG

DATA SHEET 6 (2 of 4)
CURB WEIGHT, NORMAL LOAD WEIGHT & MAXIMUM VEHICLE WEIGHT

Vehicle Normal Load on the Tire should not be greater than the Value of 94% of the load rating at the vehicle manufacturer's recommended cold inflation pressure.

MEASURED NORMAL LOAD ON TIRE VS. VALUE OF 94% OF LOAD RATING FOR THAT TIRE AT SPECIFIED PRESSURE	Front Axle	Rear Axle
A. Calculated Vehicle Normal Load on the Tire from (5)	745.3	565.3
B. Tire Load Rating (KG) of installed tire size at recommended cold inflation pressure*	1045	1095
C. Reduced Tire Load Rating, if applicable (KG)**	950	995
D. 94% of tire load rating, de-rated if appropriate (KG)	893	935
Is "D" equal to or greater than "A"? (Yes/No)	YES	YES

*Reference source used for tire/rim match verification: 2008 Tire and Rim Association Yearbook

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

DATA SHEET 6 (3 of 4)
CURB WEIGHT, NORMAL LOAD WEIGHT & MAXIMUM VEHICLE WEIGHT

C. MEASURED VEHICLE WEIGHT WITH FULL OCCUPANT LOAD

1. Seating Capacity from Placard:
   Total 6 Front 3 Rear 3

2. Full Occupant Load 408 KG
   (# of occupants x 68 KG per occupant)

3. Measured Vehicle Weight with Full Occupant Load

   LF 774.5 KG LR 624.5 KG
   RF 826.0 KG RR 600.0 KG

   Front Axle 1600.5 KG Rear Axle 1224.5 KG

   Total Vehicle 2825.0 KG

D. MEASURED VEHICLE WEIGHT WITH MAXIMUM LOAD (PLACARD)

1. Vehicle Capacity Weight (from placard) 665 KG

2. Full Occupant Load (from C.2 above) 408 KG
   (# of occupants x 68 KG per occupant)

3. Luggage/Cargo Load (subtract 2 from 1) 257 KG

4. Measured Vehicle Maximum Load on Axles
   LF 777.0 KG LR 759.0 KG
   RF 810.5 KG RR 735.5 KG

   Front Axle 1587.5 KG Rear Axle 1494.5 KG

   Total Vehicle 3082.0 KG

DATA SHEET 6 (4 of 4)
CURB WEIGHT, NORMAL LOAD WEIGHT & MAXIMUM VEHICLE WEIGHT

WEIGHT DISTRIBUTION

Item	Tire or Vehicle Rating* (KG)	Unloaded Vehicle Wt. (KG)		Vehicle Wt. With Full Occupant Load (KG)		Vehicle Maximum Wt. With Occupants and Cargo (KG)	
		Measured	Overload	Measured	Overload	Measured	Overload
Left Front Tire	950.0	669.5	No	774.5	No	777.0	No
Right Front Tire	950.0	699.5	No	826.0	No	810.5	No
Front Axle (GAWR)	1765.0	1369.0	No	1600.5	No	1587.5	No
Left Rear Tire	995.0	530.0	No	624.5	No	759.0	No
Right Rear Tire	995.0	518.0	No	600.0	No	735.5	No
Rear Axle (GAWR)	1855.0	1048.0	No	1224.5	No	1494.5	No
Total Vehicle (GVWR)	3125.0	2417.0	No	2825.0	No	3082.0	No

* Vehicle and axle weight ratings (GVWR & GAWR) are located on the vehicle certification label. Vehicle tire load ratings are based upon the inflation pressure specified on the Vehicle Placard or Tire Inflation Pressure Label for each respective axle, as determined from the appropriate Tire and Rim reference manual. If a passenger car tire is installed on a multipurpose passenger vehicle, truck or bus, the tire's load rating is reduced by dividing by 1.10.

DATA INDICATES COMPLIANCE PASS/FAIL Pass

REMARKS:

RECORDED BY: G. FARRAND DATE: 07/29/08
APPROVED BY: D. MESSICK

DATA SHEET 7 (1 of 2)
DEFLATED TIRE RETENTION

VEHICLE MAKE/MODEL/BODY STYLE: 2008 TOYOTA TUNDRA
VEHICLE NHTSA NO.: C85108 ; VIN: 5TFRV54188X045778
LABORATORY: General Testing Laboratories, Inc.
TEST DATE: July 29, 2008

Tire Pressures: LF 210 KPA LR 230 KPA
RF 210 KPA RR 230 KPA

Test Weight: LF 774.5 KG LR 754.5 KG
RF 826 KG RR 727 KG

Front Axle 1600.5 KG Rear Axle 1481.5 KG

Total Vehicle 3082 KG

Retention Test Left Front:

Odometer (START): 13 miles Fuel Level: Full

Ambient Temperature: 31.0 °C Wind Speed: 1 m/s

Vehicle Speed at time of blow-out: 96.2 kmph (97 kmph +0 kmph, -2 kmph)

Maximum Deceleration Rate: 2.5 m/sec^2 Deflation Opening Size 2.5 cm (dia.)

Stopping Distance (Distance traveled after initial release of air): 149 m

Distance of Uncontrolled Deviation from a straight line: 50 cm

Description of Bead Separation, Outboard:
None

Description of Bead Separation, Inboard:
None

Vehicle stopped with a controlled brake application (driver opinion): (X) Yes ( ) No

Deflated tire retained on rim for duration of test: (X) Yes ( ) No

DATA SHEET 7 (2 of 2)
DEFLATED TIRE RETENTION

Retention Test Right Rear:

Odometer (START): 16 miles Fuel Level: Full

Ambient Temperature: 31 °C Wind Speed: 1 m/s

Vehicle Speed at time of blow-out: 94.3 kmph (97 kmph +0 kmph, -2 kmph)

Maximum Deceleration Rate: 2.5 m/sec^2 Deflation Opening Size 2.8 cm (dia.)

Stopping Distance (Distance traveled after initial release of air): 170 m

Distance of Uncontrolled Deviation from a straight line: 0 cm

Description of Bead Separation, Outboard:
None

Description of Bead Separation, Inboard:
None

Vehicle stopped with a controlled brake application (driver opinion): (X) Yes ( ) No

Deflated tire retained on rim for duration of test: (X) Yes ( ) No

DATA INDICATES COMPLIANCE:

	PASS/FAIL
Left Front	Pass
Right Rear	Pass

REMARKS:

RECORDED BY: G. FARRAND DATE: 07/29/08
APPROVED BY: D. MESSICK

DATA SHEET 8
OWNER'S MANUAL REQUIREMENTS

VEHICLE MAKE/MODEL/BODY STYLE: 2008 TOYOTA TUNDRA
VEHICLE NHTSA NO.: C85108 ; VIN: 5TFRV54188X045778
LABORATORY: General Testing Laboratories, Inc.
TEST DATE: July 29, 2008

Owner's Manual Discusses:

Part 575.6(a) Paragraph	Required Discussion Topic	Discussed in Manual? (Yes/No)
(4) (i)	Tire labeling, including a description and explanation of each marking on the tire provided with the vehicle, and information about the location of the Tire Identification Number (TIN)	YES
(4) (ii)	A. Description and explanation of recommended cold tire inflation pressure.	YES
	B. Description and explanation of FMVSS 110 Vehicle Placard and Tire Inflation Pressure Label and their location(s)	YES
	C. Description and explanation of adverse safety consequences of under-inflation including tire failure	YES
	D. Description and explanation for measuring and adjusting air pressure to achieve proper inflation	YES
(4) (iii)	Glossary of tire terminology, including "cold tire pressure", "maximum inflation pressure", and all non-technical terms defined in S3 of FMVSS 110 and 139	YES
(4) (iv)	Tire care, including maintenance and safety practices	YES
(4) (v)	A. Description and explanation of locating and understanding load limit information, total load capacity, seating capacity, towing capacity and cargo capacity.	YES
	B. Description and explanation for calculating total and cargo load capacities with varying seating configurations including quantitative examples showing/illustrating how the vehicle's cargo and luggage capacity decreases as the combined number and size of occupants increases.	YES
	C. Description and explanation for determining compatibility of tire and vehicle load capabilities	YES
	D. Description and explanation of adverse safety consequences of overloading on handling and stopping and on tires	YES

DATA SHEET 8 Continued
OWNER'S MANUAL REQUIREMENTS

The following verbatim statement, in the English language, is provided in the Owner's Manual.
Reference Part 575.6 (a)(5) (X)Yes ( ) No

Steps for Determining Correct Load Limit:

1. Locate the statement "The combined weight of occupants and cargo should never exceed XXX kg or XXX lbs." on your vehicle's placard.
2. Determine the combined weight of the driver and passenger that will be riding in your vehicle
3. Subtract the combined weight of the driver and passenger from XXX kg or XXX lbs.
4. The resulting figure equals the available amount of cargo and luggage load capacity. For example, if the XXX amount equals 1400 lbs and there will be five 150 lb passenger in your vehicle, the amount of available cargo and luggage load capacity is 650 lbs. (1400 –750 (5 x 150) = 650 lbs.)
5. Determine the combined weight of the luggage and cargo being loaded on the vehicle. That weight may not safely exceed the available cargo and luggage load capacity calculated in Step 4.
6. If you vehicle will be towing a trailer, load from your trailer will be transferred to your vehicle. Consult the manual to determine how this reduces the available cargo and luggage load capacity of your vehicle.

DATA INDICATES COMPLIANCE PASS/FAIL Pass

REMARKS:

RECORDED BY: G. FARRAND DATE: 07/29/08
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
PAD SCALES	#1 199744LF #2 199744RF #3 199744LR #4 199744RR	199744LF 199744RF 199744LR 19974RR	01/08 01/08 01/08 01/08	01/09 01/09 01/09 01/09
PRESSURE TRANSDUCER	BLH	D-HF #65409	BEFORE USE	BEFORE USE
ANEMOMETER	OMEGA	19353-56	06/08	06/09
SLIP RING ASSEMBLY	GTL	N/A	BEFORE USE	BEFORE USE
DECELEROMETER	GTL	N/A	BEFORE USE	BEFORE USE
VBOX	RACELOGIC	VB2 #004337	06/08	06/09
LASER LEVEL	ACCULINE	40-6620	BEFORE USE	BEFORE USE

SECTION 5
PHOTOGRAPHS

2008 TOYOTA TUNDRA
NHTSA NO. C85108
FMVSS NO. 110

FIGURE 5.1
¾ FRONTAL VIEW FROM LEFT SIDE OF VEHICLE

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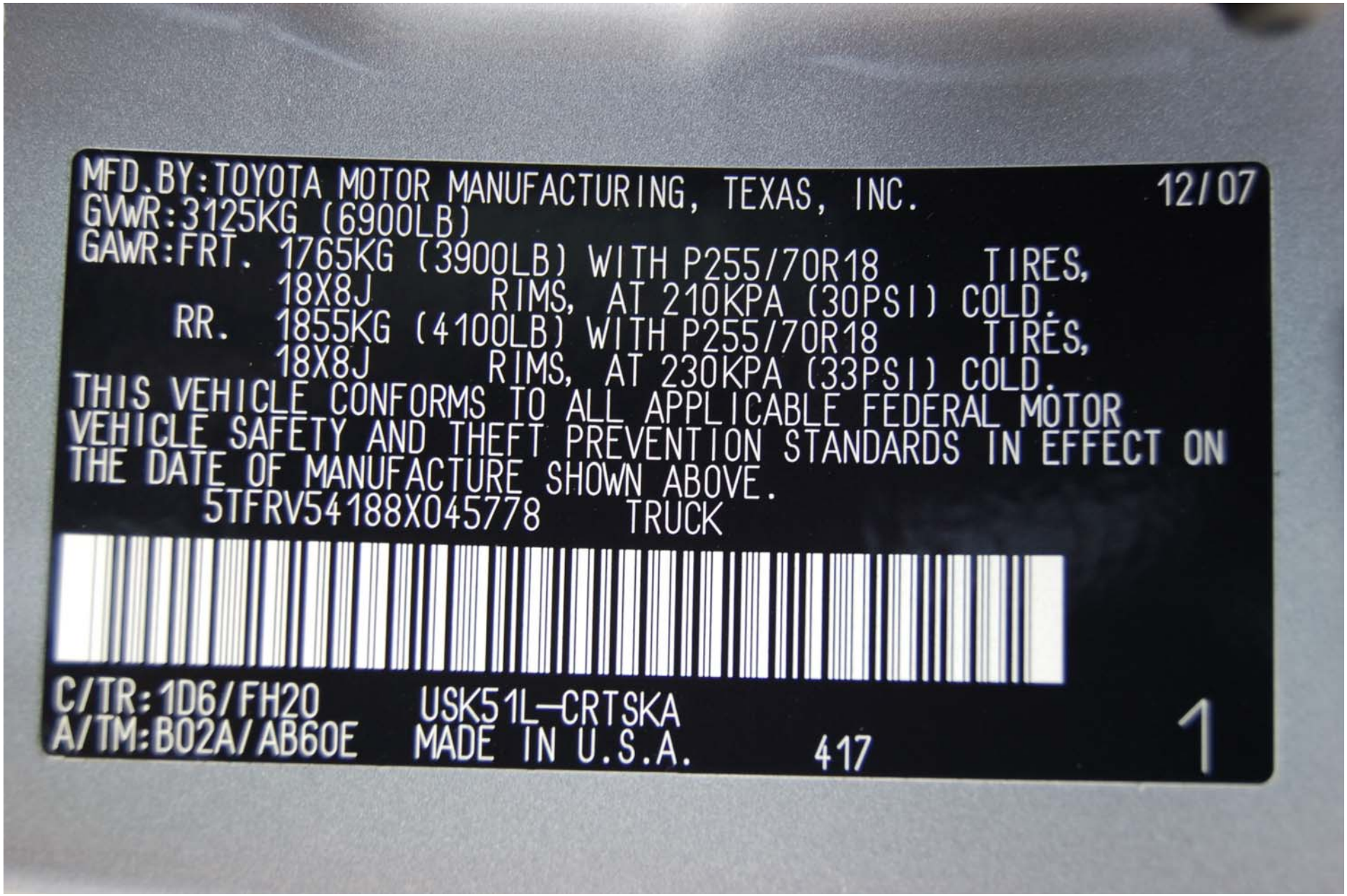
NHTSA NO. C85108
FMVSS NO. 110

FIGURE 5.2
¾ REAR VIEW FROM RIGHT SIDE OF VEHICLE



2008 TOYOTA TUNDRA
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FMVSS NO. 110

FIGURE 5.3
VEHICLE CERTIFICATION LABEL

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FIGURE 5.4
VEHICLE TIRE INFORMATION LABEL

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FIGURE 5.5
TIRE SHOWING BRAND AND MODEL

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FMVSS NO. 110

FIGURE 5.6
TIRE SHOWING SIZE

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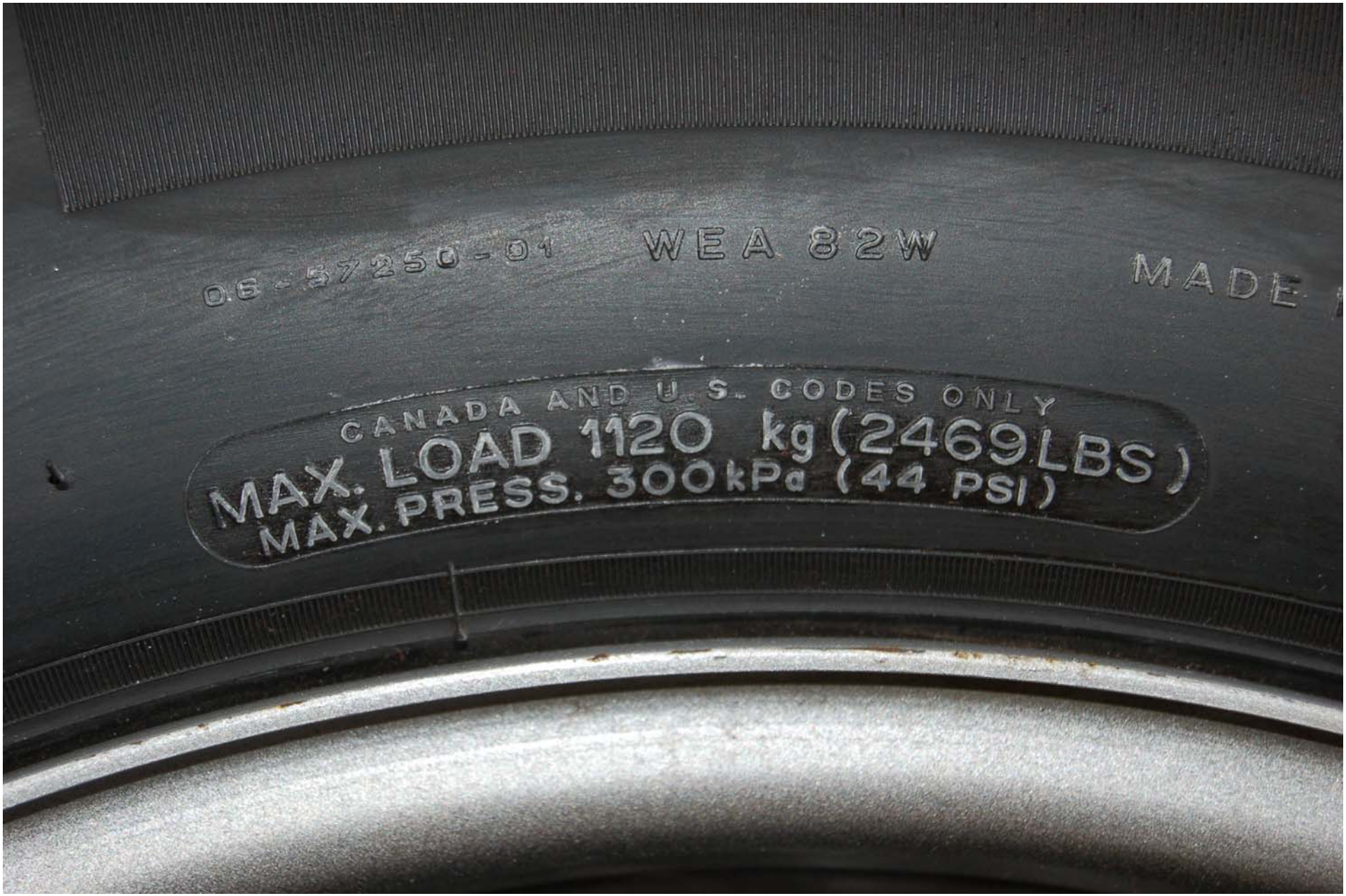
NHTSA NO. C85108
FMVSS NO. 110

FIGURE 5.7
TIRE SHOWING SIZE, LOAD INDEX AND SPEED SYMBOL



2008 TOYOTA TUNDRA
NHTSA NO. C85108
FMVSS NO. 110

FIGURE 5.8
TIRE SHOWING LOAD RATING AND INFLATION PRESSURE

2008 TOYOTA TUNDRA
NHTSA NO. C85108
FMVSS NO. 110

FIGURE 5.9
TIRE SHOWING SERIAL NUMBER

2008 TOYOTA TUNDRA
NHTSA NO. C85108
FMVSS NO. 110

FIGURE 5.10
RIM MARKINGS

2008 TOYOTA TUNDRA
NHTSA NO. C85108
FMVSS NO. 110

FIGURE 5.11
RIM MEASUREMENT

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NHTSA NO. C85108
FMVSS NO. 110

FIGURE 5.12
VEHICLE BALLAST FOR FRONT PASSENGERS

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NHTSA NO. C85108
FMVSS NO. 110

FIGURE 5.13
VEHICLE BALLAST FOR REAR PASSENGER, NORMAL LOAD

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FMVSS NO. 110

FIGURE 5.14
VEHICLE BALLAST FOR FULL LOAD

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NHTSA NO. C85108
FMVSS NO. 110

FIGURE 5.15
VEHICLE BALLAST FOR CARGO

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FIGURE 5.16
VEHICLE ON SCALES

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FIGURE 5.17
INSTRUMENTATION SET-UP

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FMVSS NO. 110

FIGURE 5.18
LEFT FRONT TIRE BLOW-OUT

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FMVSS NO. 110

FIGURE 5.19
LEFT FRONT TIRE HOLE

2008 TOYOTA TUNDRA
NHTSA NO. C85108
FMVSS NO. 110

FIGURE 5.20
LEFT FRONT TIRE OUTSIDE , POST TEST

2008 TOYOTA TUNDRA
NHTSA NO. C85108
FMVSS NO. 110

FIGURE 5.21
LEFT FRONT TIRE INSIDE, POST TEST

2008 TOYOTA TUNDRA
NHTSA NO. C85108
FMVSS NO. 110

FIGURE 5.22
RIGHT REAR TIRE BLOW-OUT

2008 TOYOTA TUNDRA
NHTSA NO. C85108
FMVSS NO. 110

FIGURE 5.23
RIGHT REAR TIRE HOLE

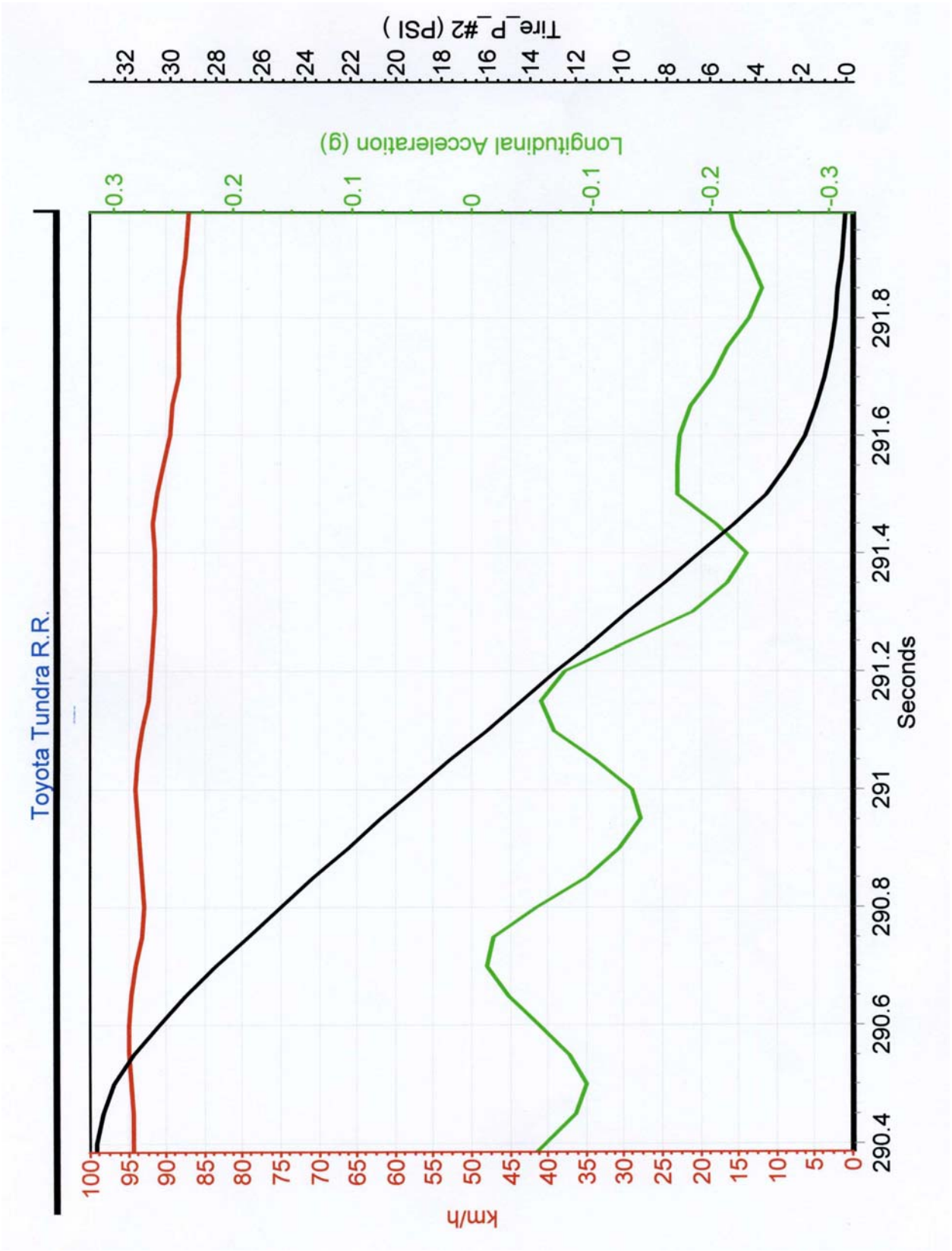
2008 TOYOTA TUNDRA
NHTSA NO. C85108
FMVSS NO. 110

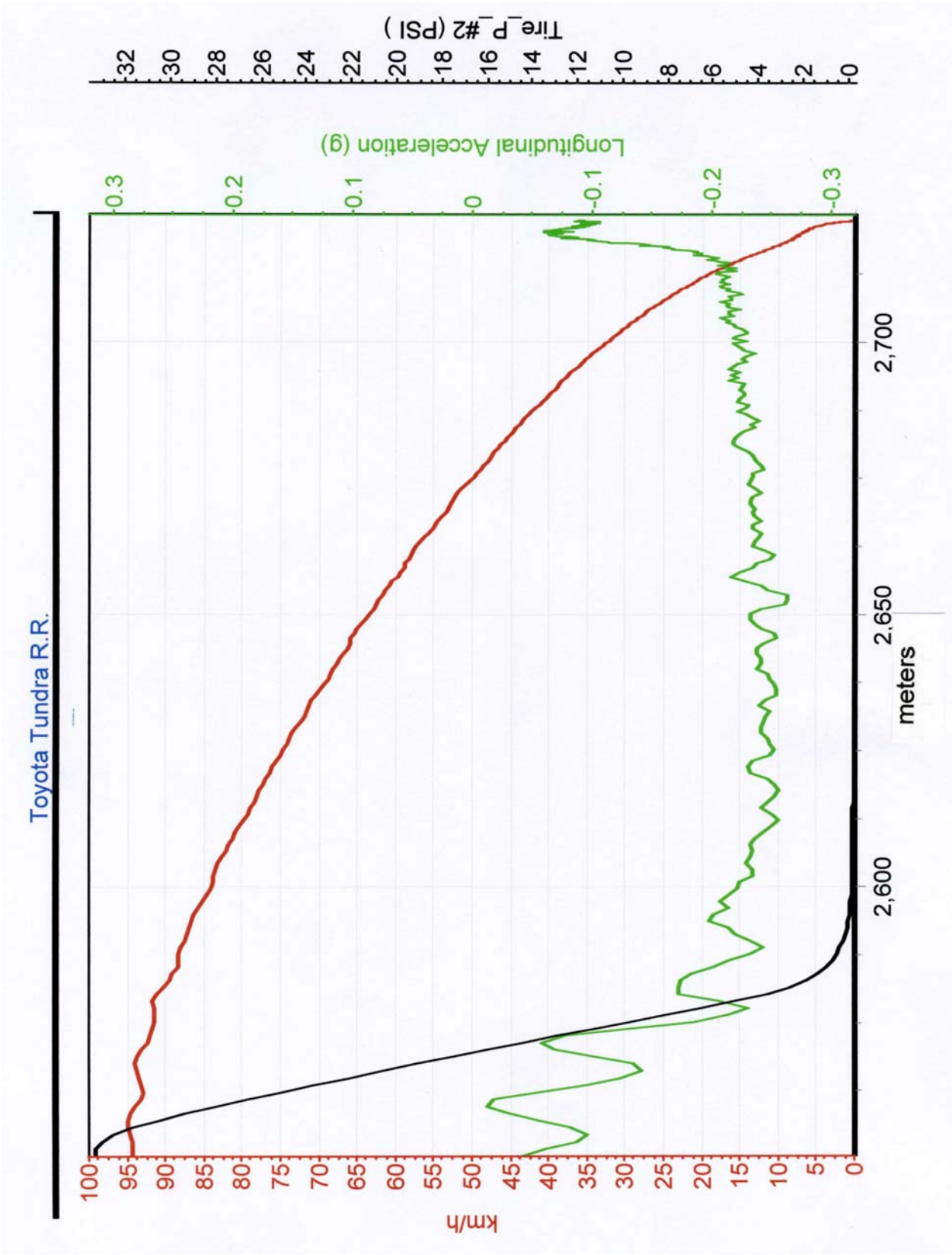
FIGURE 5.24
RIGHT REAR TIRE OUTSIDE, POST TEST

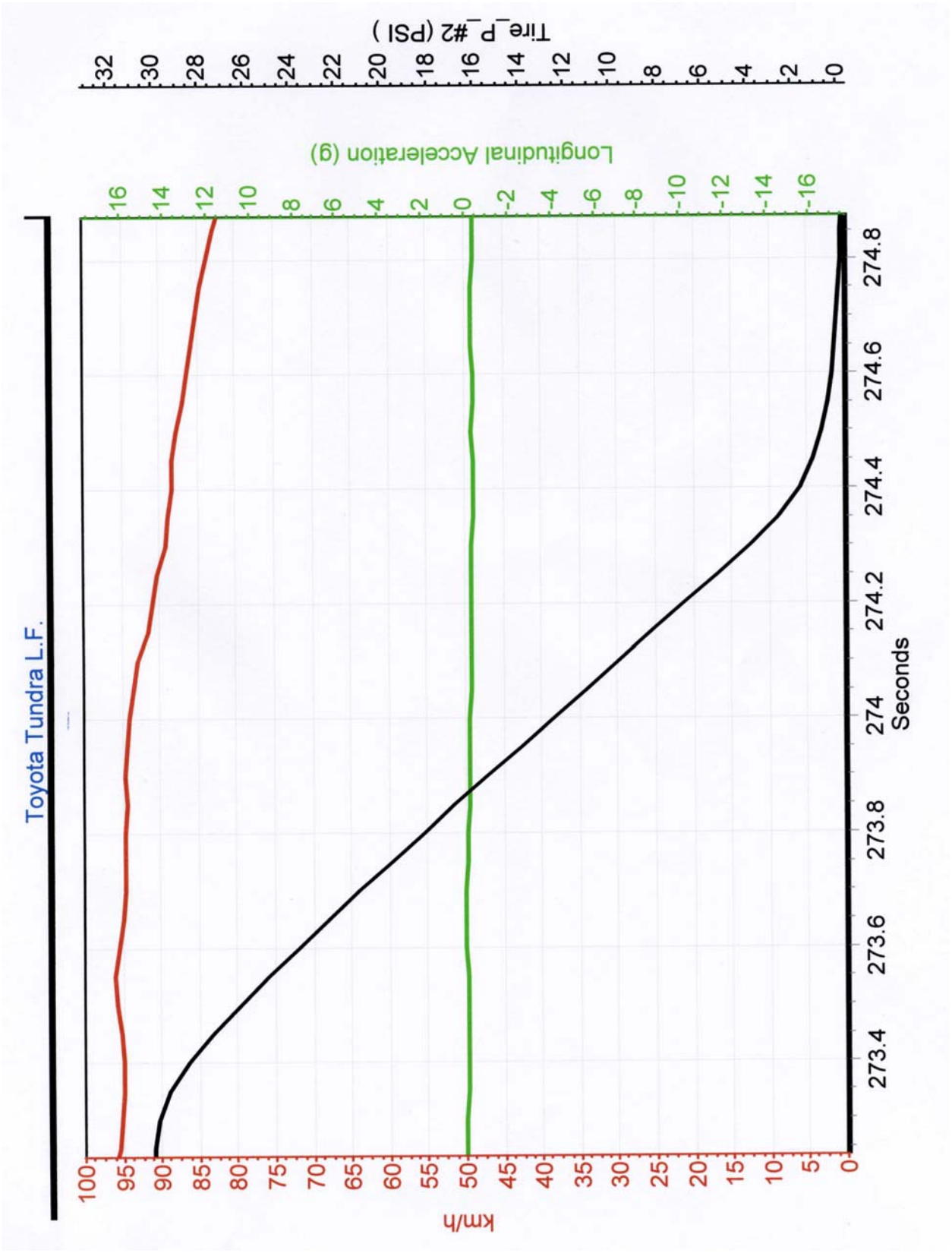
2008 TOYOTA TUNDRA
NHTSA NO. C85108
FMVSS NO. 110

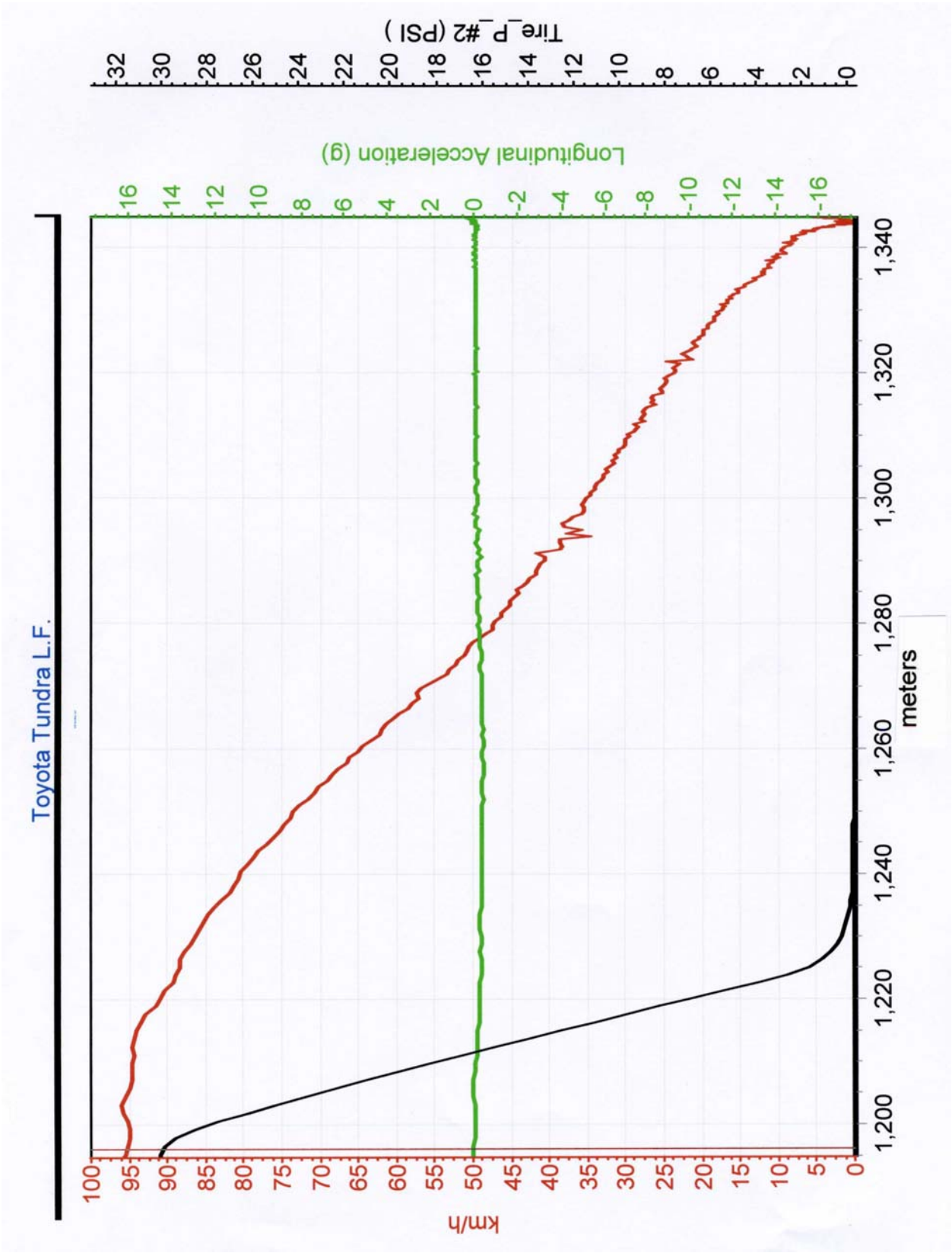
FIGURE 5.25
RIGHT REAR TIRE INSIDE , POST TEST

SECTION 6
TEST PLOTS


Toyota Tundra R.R.
km/h
Seconds
Longitudinal Acceleration (g)
Tire_P_#2 (PSI)

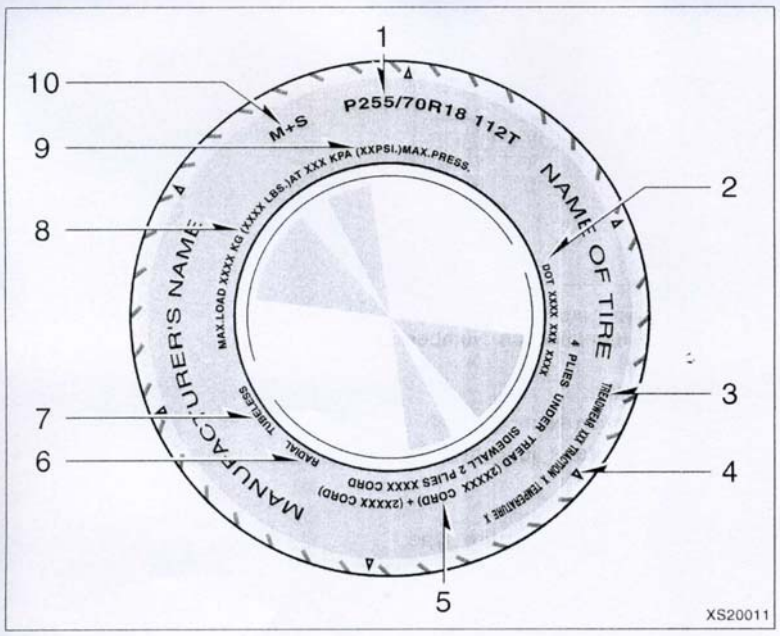

Toyota Tundra R.R.
km/h
meters
2,600
2,650
2,700
Longitudinal Acceleration (g)
Tire_P_#2 (PSI)


Toyota Tundra L.F.
km/h
Seconds
Longitudinal Acceleration (g)
Tire_P_#2 (PSI)


Toyota Tundra L.F.
km/h
meters
Longitudinal Acceleration (g)
Tire_P_#2 (PSI)

SECTION 7
OWNER'S MANUAL INFORMATION

Tire information—
—Tire symbols

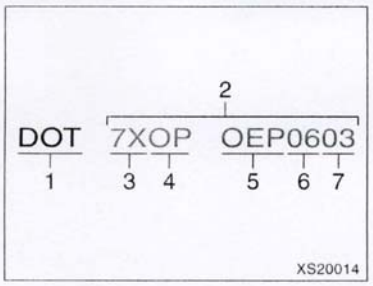


This illustration indicates typical tire symbols.

1. **Tire size**—For details, see "—Tire size" on page 459.
2. **DOT and Tire Identification Number (TIN)**—For details, see "—DOT and Tire Identification Number (TIN)" on page 458.
3. **Uniform tire quality grading**—For details, see "—Uniform tire quality grading" on page 460.
4. **The location of the treadwear indicators**—For details, see "Checking and replacing tires" on page 556.
5. **Tire ply composition and materials**—Plies mean a layer of rubber-coated parallel cords. Cords mean the strands forming the plies in the tire.
6. **Radial tires or bias-ply tires**—A radial tire has "RADIAL" on the sidewall. A tire not marked with "RADIAL" is a bias-ply tire.

7. **"TUBELESS" or "TUBE TYPE"**—A tubeless tire does not have a tube inside the tire and air is directly filled in the tire. A tube type tire has a tube inside the tire and the tube maintains the air pressure.
8. **Load limit at maximum cold tire inflation pressure**—For details, see "Checking and replacing tires" on page 556.
9. **Maximum cold tire inflation pressure**—This means the pressure to which a tire may be inflated. For details about recommended cold tire inflation pressure, see "Tires" on page 591.
10. **Summer tire or all season tire**—An all season tire has "M+S" on the sidewall. The tire not marked with "M+S" is a summer tire. For details, see "Types of tires" on page 472.

—DOT and Tire Identification Number (TIN)

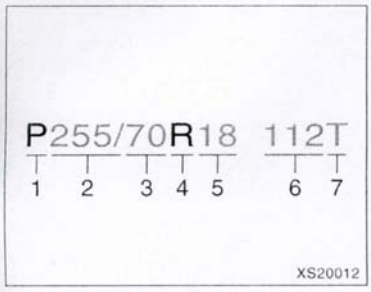


This illustration indicates typical DOT and Tire Identification Number (TIN).

1. "DOT" symbol
2. Tire Identification Number (TIN)
3. Tire manufacturer's identification mark
4. Tire size code
5. Manufacturer's optional tire type code (3 or 4 letters)
6. Manufacturing week
7. Manufacturing year

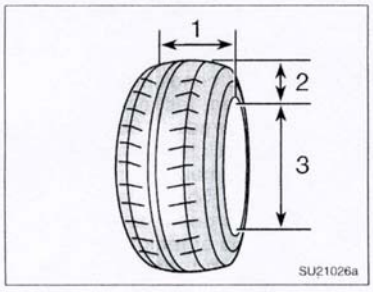
The "DOT" symbol certifies that the tire conforms to applicable Federal Motor Vehicle Safety Standards.

—Tire size



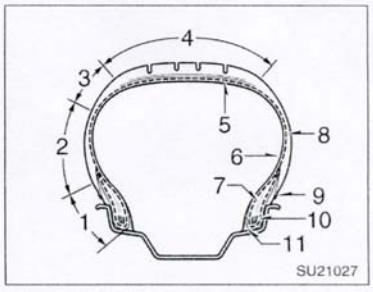
This illustration indicates typical tire size.

1. Tire use (P=Passenger car, T=Temporary use)
2. Section width (in millimeters)
3. Aspect ratio (tire height to section width)
4. Tire construction code (R=Radial, D=Diagonal)
5. Wheel diameter (in inches)
6. Load index (2 digits or 3 digits)
7. Speed symbol (alphabet with one letter)



1. Section width
2. Tire height
3. Wheel diameter

—Name of each section of tire



1. Bead
2. Sidewall
3. Shoulder
4. Tread
5. Belt
6. Inner liner
7. Reinforcing rubber
8. Carcass
9. Rim lines
10. Bead wires
11. Chafer

—Uniform tire quality grading

This information has been prepared in accordance with regulations issued by the National Highway Traffic Safety Administration of the U.S. Department of Transportation. It provides the purchasers and/or prospective purchasers of Toyota vehicles with information on uniform tire quality grading.

Your Toyota dealer will help answer any questions you may have as you read this information.

DOT quality grades—All passenger vehicle tires must conform to Federal Safety Requirements in addition to these grades. Quality grades can be found where applicable on the tire sidewall between tread shoulder and maximum section width. For example: Treadwear 200 Traction AA Temperature A

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emperature A, B, C—The temperture grades are A (the highest), B, nd C, representing the tire's resisince to the generation of heat and s ability to dissipate heat when sted under controlled conditions n a specified indoor laboratory test heel. Sustained high temperature an cause the material of the tire to egenerate and reduce tire life, and xcessive temperature can lead to udden tire failure. The grade C corsponds to a level of performance hich all passenger car tires must eet under the Federal Motor Vecle Safety Standard No.109. rades B and A represent higher vels of performance on the laboraory test wheel than the minimum reuired by law.

Varning: The temperature grades r this tire are established for a tire at is properly inflated and not overaded. Excessive speed, underflation, or excessive loading, either eparately or in combination, can ause heat buildup and possible tire ailure.

Treadwear—The treadwear grade is a comparative rating based on the wear rate of the tire when tested under controlled conditions on a specified government test course. For example, a tire graded 150 would wear one and a half (1-1/2) times as well on the government course as a tire graded 100. The relative performance of tires depends upon the actual conditions of their use, however, and may depart significantly from the norm due to variations in driving habits, service practices and differences in road characteristics and climate.

Traction AA, A, B, C—The traction grades, from highest to lowest, are AA, A, B, and C, and they represent the tire's ability to stop on wet pavement as measured under controlled conditions on specified government test surfaces of asphalt and concrete. A tire marked C may have poor traction performance.

Warning: The traction grade assigned to this tire is based on braking (straight ahead) traction tests and does not include cornering (turning) traction.

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—Glossary of tire terminology

Tire related term	Meaning
Cold tire inflation pressure	tire inflation pressure when the vehicle has been parked for at least 3 hours or more, or it has not been driven more than 1.5 km or 1 mile under that condition
Maximum inflation pressure	the maximum cold inflation pressure to which a tire may be inflated and it is shown on the sidewall of the tire
Recommended inflation pressure	cold tire inflation pressure recommended by a manufacturer
Accessory weight	the combined weight (in excess of those standard items which may be replaced) of automatic transmission, power steering, power brakes, power windows, power seats, radio, and heater, to the extent that these items are available as factory–installed equipment (whether installed or not)
Curb weight	the weight of a motor vehicle with standard equipment including the maximum capacity of fuel, oil, and coolant, and, if so equipped, air conditioning and additional weight optional engine
Maximum loaded vehicle weight	the sum of— (a) curb weight; (b) accessory weight; (c) vehicle capacity weight; and (d) production options weight
Normal occupant weight	68 kg (150 lb.) times the number of occupants specified in the second column of Table 1 that follows

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Tire related term	Meaning
Occupant distribution	distribution of occupants in a vehicle as specified in the third column of Table 1 that follows
Production options weight	the combined weight of those installed regular production options weighing over 2.3 kg (5 lb.) in excess of those standard items which they replace, not previously considered in curb weight or accessory weight, including heavy duty brakes, ride levelers, roof rack, heavy duty battery, and special trim
Rim	a metal support for a tire or a tire and tube assembly upon which the tire beads are seated
Rim diameter (Wheel diameter)	nominal diameter of the bead seat
Rim size designation	rim diameter and width
Rim type designation	the industry of manufacturer's designation for a rim by style or code
Rim width	nominal distance between rim flanges
Vehicle capacity weight (Total load capacity)	the rated cargo and luggage load plus 68 kg (150 lb.) times the vehicle's designated seating capacity
Vehicle maximum load on the tire	the load on an individual tire that is determined by distributing to each axle its share of the maximum loaded vehicle weight and dividing by two
Vehicle normal load on the tire	the load on an individual tire that is determined by distributing to each axle its share of the curb weight, accessory weight, and normal occupant weight (distributed in accordance with Table 1 that follows) and dividing by two

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Tire related term	Meaning
Weather side	the surface area of the rim not covered by the inflated tire
Bead	the part of the tire that is made of steel wires, wrapped or reinforced by ply cords and that is shaped to fit the rim
Bead separation	a breakdown of the bond between components in the bead
Bias ply tire	a pneumatic tire in which the ply cords that extend to the beads are laid at alternate angles substantially less than 90 degrees to the centerline of the tread
Carcass	the tire structure, except tread and sidewall rubber which, when inflated, bears the load
Chunking	the breaking away of pieces of the tread or sidewall
Cord	the strands forming the plies in the tire
Cord separation	the parting of cords from adjacent rubber compounds
Cracking	any parting within the tread, sidewall, or innerliner of the tire extending to cord material
CT	a pneumatic tire with an inverted flange tire and rim system in which the rim is designed with rim flanges pointed radially inward and the tire is designed to fit on the underside of the rim in a manner that encloses the rim flanges inside the air cavity of the tire
Extra load tire	a tire designed to operate at higher loads and at higher inflation pressures than the corresponding standard tire

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Tire related term	Meaning
Groove	the space between two adjacent tread ribs
Innerliner	the layer(s) forming the inside surface of a tubeless tire that contains the inflating medium within the tire
Innerliner separation	the parting of the innerliner from cord material in the carcass
Intended outboard sidewall	(A) the sidewall that contains a whitewall, bears white lettering or bears manufacturer, brand, and/or model name molding that is higher or deeper than the same molding on the other sidewall of the tire, or (B) the outward facing sidewall of an asymmetrical tire that has a particular side that must always face outward when mounted on a vehicle
Light truck (LT) tire	a tire designated by its manufacturer as primarily intended for use on light-weight trucks or multipurpose passenger vehicles
Load rating	the maximum load that a tire is rated to carry for a given inflation pressure
Maximum load rating	the load rating for a tire at the maximum permissible inflation pressure for that tire
Maximum permissible inflation pressure	the maximum cold inflation pressure to which a tire may be inflated
Measuring rim	the rim on which a tire is fitted for physical dimension requirements
Open splice	any parting at any junction of tread, sidewall, or innerliner that extends to cord material

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Tire related term	Meaning
Outer diameter	the overall diameter of an inflated new tire
Overall width	the linear distance between the exteriors of the sidewalls of an inflated tire, including elevations due to labeling, decorations, or protective bands or ribs
Passenger car tire	a tire intended for use on passenger cars, multipurpose passenger vehicles, and trucks, that have a gross vehicle weight rating (GVWR) of 10,000 lb. or less
Ply	a layer of rubber-coated parallel cords
Ply separation	a parting of rubber compound between adjacent plies
Pneumatic tire	a mechanical device made of rubber, chemicals, fabric and steel or other materials, that, when mounted on an automotive wheel, provides the traction and contains the gas or fluid that sustains the load
Radial ply tire	a pneumatic tire in which the ply cords that extend to the beads are laid at substantially 90 degrees to the centerline of the tread
Reinforced tire	a tire designed to operate at higher loads and at higher inflation pressures than the corresponding standard tire
Section width	the linear distance between the exteriors of the sidewalls of an inflated tire, excluding elevations due to labeling, decoration, or protective bands
Sidewall	that portion of a tire between the tread and bead
Sidewall separation	the parting of the rubber compound from the cord material in the sidewall

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Tire related term	Meaning
Snow tire	a tire that attains a traction index equal to or greater than 110, compared to the ASTM E-1136 Standard Reference Test Tire, when using the snow traction test as described in ASTM F-1805-00, Standard Test Method for Single Wheel Driving Traction in a Straight Line on Snow-and Ice-Covered Surfaces, and which is marked with an Alpine Symbol () on at least one sidewall
Test rim	the rim on which a tire is fitted for testing, and may be any rim listed as appropriate for use with that tire
Tread	that portion of a tire that comes into contact with the road
Tread rib	a tread section running circumferentially around a tire
Tread separation	pulling away of the tread from the tire carcass
Treadwear indicators(TWI)	the projections within the principal grooves designed to give a visual indication of the degrees of wear of the tread
Wheel-holding fixture	the fixture used to hold the wheel and tire assembly securely during testing

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Table 1– Occupant loading and distribution for vehicle normal load for various designated seating capacities

Designated seating capacity, number 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 20	7	2 in front, 2 in second seat, 2 in third seat, 1 in fourth seat

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Vehicle load limits

Vehicle load limits include total load capacity, seating capacity, towing capacity and cargo capacity. Follow the load limits shown below. Total load capacity and seating capacity are also described on the tire and loading information label. For location of the tire and loading information label, see "Checking tire inflation pressure" on page 553.

Total load capacity:

Total load capacity means combined weight of occupants, cargo and luggage. Tongue load is included when trailer towing. For the total load capacity about your vehicle, see "Vehicle capacity weight" on page 580 in Section 8.

Seating capacity:

Regular cab models
- With separate seats
  - Total 2
- With bench seats
  - Total 3

Double cab and Crew Max models
- With separate seats
  - Total 5 (Front 2, Rear 3)
- With bench seats
  - Total 6 (Front 3, Rear 3)

Seating capacity means the maximum number of occupants whose estimated average weight is 68 kg (150 lb.) per person. Depending on the weight of each person, the seating capacity given may exceed the total load capacity.

NOTICE

Even if the number of occupants are within the seating capacity, do not exceed the total load capacity.

Towing capacity:

Towing capacity means the maximum allowable gross trailer weight (trailer weight plus its cargo weight) that your vehicle is able to tow. For the towing capacity about your vehicle, see "Towing capacity" on page 583 in Section 8.

Cargo capacity

Cargo capacity may increase or decrease depending on the size (weight) and the number of occupants. For details, see "Capacity and distribution" that follows.

⚠ CAUTION

Do not apply the load more than each load limit. That may cause not only damage to the tires, but also deterioration to the steering ability and braking ability, which may cause an accident.

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Cargo and luggage—
—Stowage precautions

When stowing cargo and luggage in the vehicle, observe the following:

- Put cargo and luggage in the rear deck when at all possible. Be sure all items are secured in place.
- Be careful to keep the vehicle balanced. Locating the weight as far forward as possible helps maintain balance.
- For better fuel economy, do not carry unneeded weight.

⚠ CAUTION

- **To prevent cargo and luggage from sliding forward during braking, do not stack anything behind the front seats higher than the seatbacks. Keep cargo and luggage low, as close to the floor as possible.**

- **Never allow anyone to ride in the rear deck. It is not designed for passengers. They should ride in their seats with their seat belts properly fastened. Otherwise, they are much more likely to suffer death or serious bodily injury, in the event of sudden braking or a collision.**
- **Do not drive with objects left on top of the instrument panel. They may interfere with the driver's field of view. Or they may move during sharp vehicle acceleration or turning, and impair the driver's control of the vehicle. In an accident they may injure the vehicle occupants.**

—Capacity and distribution

Cargo capacity depends on the total weight of the occupants.

(Cargo capacity) = (Total load capacity) – (Total weight of occupants)

Steps for Determining Correct Load Limit—

(1) Locate the statement "The combined weight of occupants and cargo should never exceed XXX kg or XXX lbs." on your vehicle's placard.

(2) Determine the combined weight of the driver and passengers that will be riding in your vehicle.

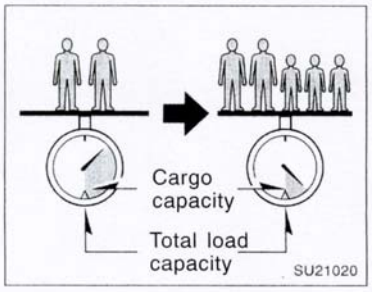
(3) Subtract the combined weight of the driver and passengers from XXX kg or XXX lbs.

(4) The resulting figure equals the available amount of cargo and luggage load capacity. For example, if the "XXX" amount equals 1400 lbs. and there will be five 150 lb passengers in your vehicle, the amount of available cargo and luggage load capacity is 650 lbs. (1400–750 (5x150)=650 lbs.)

(5) Determine the combined weight of luggage and cargo being loaded on the vehicle. That weight may not safely exceed the available cargo and luggage load capacity calculated in Step 4.

(6) If your vehicle will be towing a trailer, load from your trailer will be transferred to your vehicle. Consult this manual to determine how this reduces the available cargo and luggage load capacity of your vehicle.

For details about trailer towing, see "Trailer towing" on page 481 in Section 3.



Example on Your Vehicle

In case that 2 people with the combined weight of A kg (lb.) are riding in your vehicle with the total load capacity of B kg (lb.), the available amount of cargo and luggage load capacity will be C kg (lb.) as follows:

B kg (lb.) – A kg (lb.) = C kg (lb.)

From this condition, if 3 more passengers with the combined weight of D kg (lb.) get on, the available cargo and luggage load will be reduced E kg (lb.) as follows:

C kg (lb.) – D kg (lb.) = E kg (lb.)

As shown in the above example, if the number of occupants increases, the cargo and luggage load equaling the combined weight of occupants who got on later must be reduced. In other words, if the increase in the number of occupants causes the excess of the total load capacity (combined weight of occupants plus cargo and luggage load), you have to reduce the cargo and luggage on your vehicle.

For details about total load capacity, see "Vehicle load limits" on page 469 in this Section.

⚠ CAUTION

Even if the total load of occupant's weight and the cargo load is less than the total load capacity, do not apply the load unevenly. That may cause not only damage to the tire but also deterioration to the steering ability due to unbalance of the vehicle, causing an accident.

Types of tires

Determine what kind of tires your vehicle is originally equipped with.

1. Summer tires

Summer tires are high-speed capability tires best suited to highway driving under dry conditions.

Since summer tires do not have the same traction performance as snow tires, summer tires are inadequate for driving on snow-covered or icy roads. For driving on snow-covered or icy roads, we recommend using snow tires. If installing snow tires, be sure to replace all four tires.

2. All season tires

All season tires are designed to provide better traction in snow and to be adequate for driving in most winter conditions, as well as for use all year round.

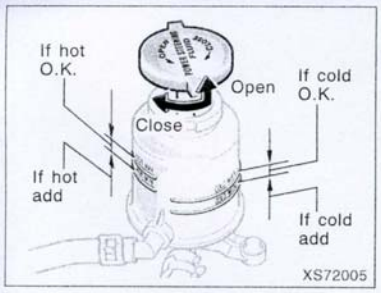
All season tires, however, do not have adequate traction performance compared with snow tires in heavy or loose snow. Also, all season tires fall short in acceleration and handling performance compared with summer tires in highway driving.

The details about how to distinguish summer tires from all season tires are described on page 457.

⚠ CAUTION

- **Do not mix summer and all season tires on your vehicle as this can cause dangerous handling characteristics, resulting in loss of control.**
- **Do not use tires other than the manufacture's designated tires, and never mix tires or wheels of the sizes different from the originals.**

Checking power steering fluid



Check the fluid level through the reservoir. If necessary, add automatic transmission fluid DEXRON®II or III.

If the vehicle has been driven around 80 km/h (50 mph) for 20 minutes (a little more in frigid temperatures), the fluid is hot (60°C—80°C or 140°F—175°F). You may also check the level when the fluid is cold (about room temperature, 10°C—30°C or 50°F—85°F) if the engine has not been run for about five hours.

Clean all dirt from the outside of the reservoir tank and look at the fluid level. If the fluid is cold, the level should be in the "COLD" range. Similarly, if it is hot, the fluid level should be in the "HOT" range. If the level is at the low side of either range, add automatic transmission fluid DEXRON®II or III to bring the level within the range.

To remove the reservoir cap, turn it counterclockwise and lift up. To reinstall it, turn it clockwise. After replacing the reservoir cap, visually check the steering box case, vane pump and hose connections for leaks or damage.

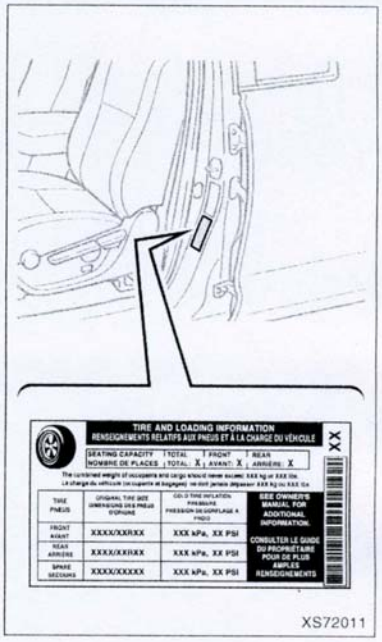
⚠ CAUTION

The reservoir tank may be hot so be careful not to burn yourself.

NOTICE

Avoid overfilling, or the power steering could be damaged.

Checking tire inflation pressure



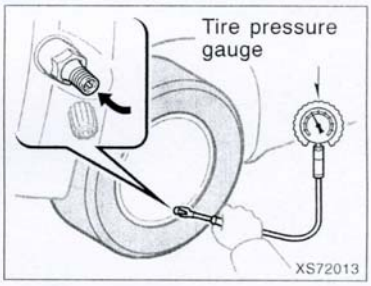
Keep your tire inflation pressures at the proper level.

The recommended cold tire inflation pressures, tire sizes and the combined weight of occupants and cargo (vehicle capacity weight) are described on page 580 in Section 8. They are also described on the tire and loading information label as shown.

You should check the tire inflation pressure every two weeks, or at least once a month. And do not forget the spare!

The following instructions for checking tire inflation pressure should be observed:

- **The pressure should be checked only when the tires are cold.** If your vehicle has been parked for at least 3 hours and has not been driven for more than 1.5 km or 1 mile since, you will get an accurate cold tire inflation pressure reading.
- **Always use a tire pressure gauge.** The appearance of a tire can be misleading. Besides, tire inflation pressures that are even just a few pounds off can degrade ride and handling.
- **Do not bleed or reduce tire inflation pressure after driving.** It is normal for the tire inflation pressure to be higher after driving.
- **Never exceed the vehicle capacity weight.** Passenger and luggage weight should be located so that the vehicle is balanced.



INSPECTION AND ADJUSTMENT PROCEDURE

1. Remove the tire valve cap.
2. Press the tip of the tire pressure gauge to the tire valve.
3. Read the pressure using the graduations of the gauge.
4. In case the tire inflation pressure is not within the prescribed range, insert the compressed air from the valve. In case of applying too much air, press the center of the valve and release the air to adjust.

5. After completing the tire inflation pressure measurement and adjustment, apply soapy water to the valve and check for leakage.
6. Install the tire valve cap.

If a gauge and air pump are not available, have your vehicle checked by your Toyota dealer.

⚠ CAUTION

Be sure to reinstall the tire valve caps. Without the valve caps, dirt or moisture could get into the valve core and cause air leakage. If the caps have been lost, have new ones put on as soon as possible.

Incorrect tire inflation pressure may waste fuel, reduce the comfort of driving, reduce tire life and make your vehicle less safe to drive.

If a tire frequently needs refilling, have it checked by your Toyota dealer.

⚠ CAUTION

Keep your tires properly inflated. Otherwise, the following conditions may occur and cause an accident resulting in death or serious injuries.

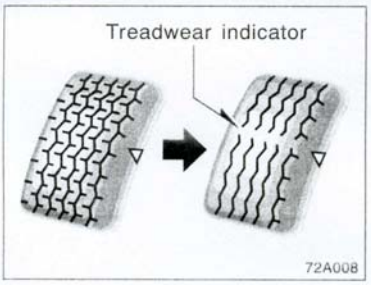
Low tire pressure (underinflation)—

- **Excessive wear**
- **Uneven wear**
- **Poor handling**
- **Possibility of blowouts from an overheated tire**
- **Poor sealing of the tire bead**
- **Wheel deformation and/or tire separation**
- **A greater possibility of tire damage from road hazards**

High tire pressure (overinflation)—

- **Poor handling**
- **Excessive wear**
- **Uneven wear**
- **A greater possibility of tire damage from road hazards**

Checking and replacing tires



CHECKING YOUR TIRES

Check the tire's tread for treadwear indicators. If the indicators show, replace the tires. The location of treadwear indicators is shown by the "TWI" or "Δ" marks, etc., molded on the sidewall of each tire.

The tires on your Toyota have built-in treadwear indicators to help you know when the tires need replacement. When the tread depth wears to 1.6 mm (0.06 in.) or less, the indicators will appear. If you can see the indicators in two or more adjacent grooves, the tire should be replaced. The lower the tread, the higher the risk of skidding.

The effectiveness of snow tires is lost if the tread wears down below 4 mm (0.16 in.).

If you have tire damage such as cuts, splits, cracks deep enough to expose the fabric, or bulges indicating internal damage, the tire should be replaced.

If a tire often goes flat or cannot be properly repaired due to the size or location of a cut or other damage, it should be replaced. If you are not sure, consult with your Toyota dealer.

If air loss occurs while driving, do not continue driving. Driving even a short distance can damage a tire beyond repair.

Any tires which are over 6 years old must be checked by a qualified technician even if damage is not obvious.

Tires deteriorate with age even if they have never or seldom been used.

This applies also to the temporary spare tire and tires stored for future use.

REPLACING YOUR TIRES

When replacing a tire, use a tire of the same size and construction, and the same or greater maximum load as the originally installed tires. Also, on four-wheel drive models, all the tires must be the same brand and have the same tread patterns.

Using any other size or type of tire may seriously affect handling, ride, speedometer/odometer calibration, ground clearance, and clearance between the body and tires or snow chains.

Check that the maximum load of the replaced tire is greater than 1/2 of the Gross Axle Weight Ratings (GAWR) of either the front axle or the rear axle, whichever is greater. As for the maximum load of the tire, see the load limit at maximum cold tire inflation pressure mentioned on the sidewall of the tire, and as for the Gross Axle Weight Ratings (GAWR), see the Certification Label.

For details about the sidewall of the tire and the Certification Label, see "Tire information" on page 457 in Section 2 and "Your Toyota's identification" on page 455 in Section 2.

⚠ CAUTION

Observe the following instructions. Otherwise, an accident may occur resulting in death or serious injuries.

- **Do not mix radial, bias belted, or bias-ply tires on your vehicle, as this may cause dangerous handling characteristics resulting in loss of control.**
- **Do not use tires other than the manufacturer's recommended size, as this may cause dangerous handling characteristics resulting in loss of control.**
- **Do not use tires of different brands, sizes and constructions. This may damage the drive system and prevent the vehicle stability control system from functioning correctly.**
- **Four-wheel drive models: Do not use tires of different brands, sizes, construction or tread patterns, as this may cause dangerous handling characteristics resulting in loss of control.**

Toyota recommends all four tires, or at least both of the front or rear tires be replaced at a time as a set.

See "If you have a flat tire" on page 503 in Section 4 for tire change procedure.

When a tire is replaced, the wheel should always be balanced.

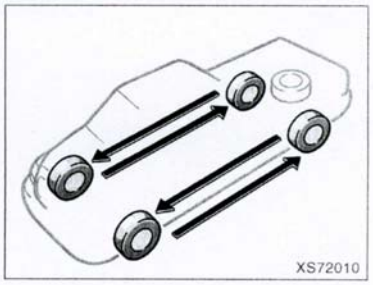
An unbalanced wheel may affect vehicle handling and tire life. Wheels can get out of balance with regular use and should therefore be balanced occasionally.

The tire pressure warning system must be initialized when the specified tire inflation pressure is changed due to tire replacement. See "Tire pressure warning system" on page 254 in Section 1-7.

NOTICE

- ***When the tires must be repaired or replaced, have them repaired or replaced by the nearest Toyota dealer or authorized tire dealer. Failure to do so may cause the tire pressure warning valves and transmitters to be damaged when the tires are removed or installed.***
- ***Remove the tire pressure warning valves and transmitters before replacing the tires to prevent the tire pressure warning valves and transmitters from being damaged.***

Rotating tires



To equalize the wear and help extend tire life, Toyota recommends that you rotate your tires according to the maintenance schedule. (For scheduled maintenance information, please refer to the "Scheduled Maintenance Guide" or "Owner's Manual Supplement".) However, the most appropriate timing for tire rotation may vary according to your driving habits and road surface conditions.

Tires

Tire size, cold tire inflation pressure and wheel size:

Tire size	Cold tire inflation pressure kPa (kgf/cm^2 or bar, psi)		Temporary spare	Wheel size
	Front	Rear		
P255/70R18 112T	210 (2.1, 30)	230 (2.3, 33)	230 (2.3, 33)	18 × 8J
P275/65R18 114T	210 (2.1, 30)	230 (2.3, 33)	230 (2.3, 33)	18 × 8J
P275/55R20 111H	210 (2.1, 30)	230 (2.3, 33)	230 (2.3, 33)	20 × 8J

Wheel nut torque, N·m (kgf·m, ft·lbf):

Steel wheels	209 (21.3, 154)
Aluminum wheels	131 (13.4, 97)

NOTE: For complete information on tires (e.g. replacing tires or replacing wheels), see "Checking tire inflation pressure" through "Wheel precautions", pages 553 through 562, in Section 7-2.