

TOYO TIRE TALK

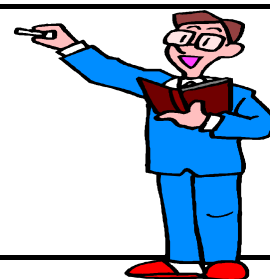
No.02-006 (TTT-127)

Technical Service Department Japan.

Technical tips and information that may allow you to better serve your customers.

We would appreciate your input, please contact us.

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25th February, 2002

Subject : Inflation Pressure Part 4 - The Recommended Replacement of P-metric Tires and LT-metric Tires

Recently the trend for SUV's (Sport Utility Vehicles), 4WD's, RV's, Pick-ups, vans and minivans fitted with either P-metric* tires or LT-metric** tires is increasing.

* P-metric :

Stands for passenger and P type tires mainly intended for "personal use" passenger vehicles.

** LT-metric :

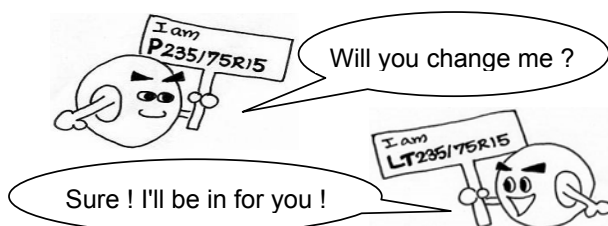
Stands for Light Truck, and designates tires which are mainly for heavy duty or commercial use.

For owners of such vehicles, the following cases require particular attention when replacing O.E. tires with other tires.

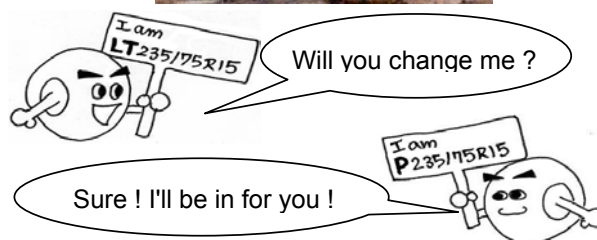
- 1) The case that P-metric O.E. tires are replaced with LT-metric tires.
- 2) The case that LT-metric O.E. tires are replaced with P-metric tires.

In the above cases, a common belief is that "there is no problem if tires with same size markings as the O.E. tires are installed". Unfortunately this is a misunderstanding of the full tire size description.

O.E. Size : P235/75R15 105S



O.E. Size : LT235/75R15 104Q

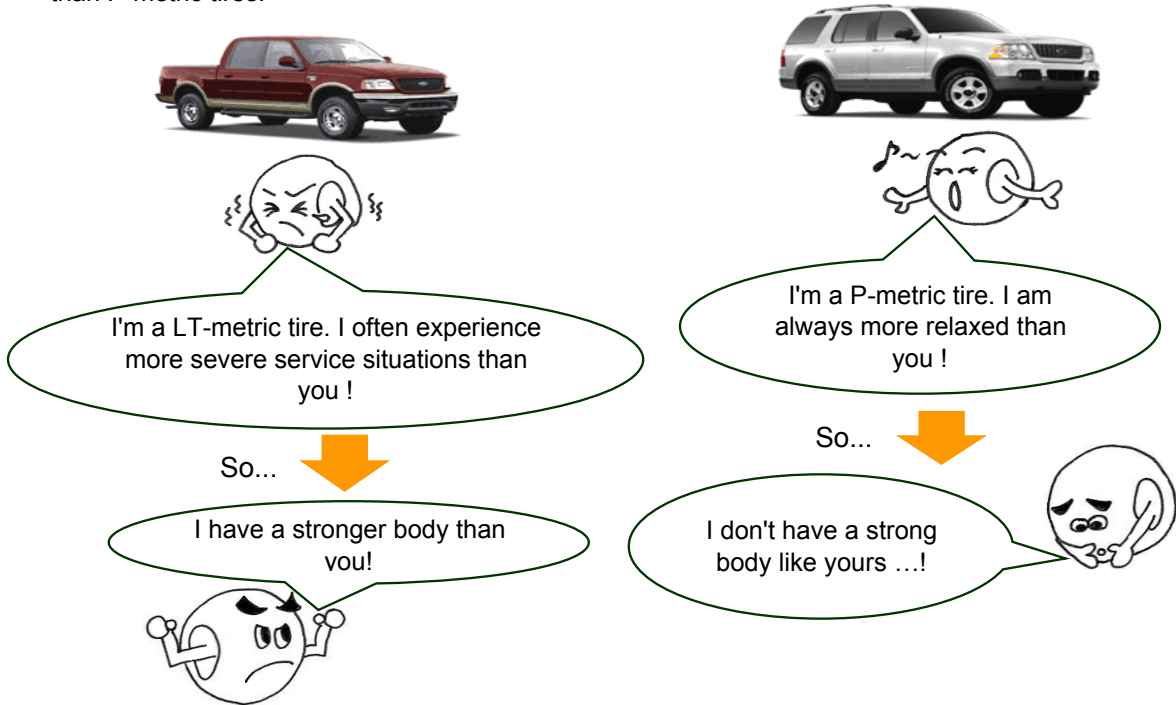


Great care about the tire "**Load Capacity**" and "**Inflation Pressure**" must be taken in the above cases!



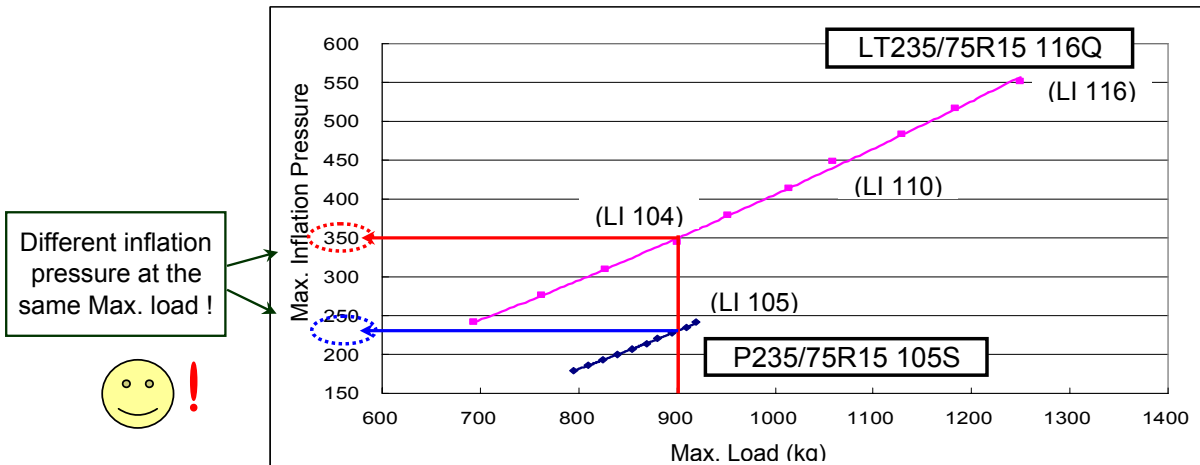
We would like to explain about the reason for such a misunderstanding.

Basically LT-metric tires are designed with stronger cases than P-metric tires, because of the assumption that LT-metric tires will experience more severe loading and operating conditions than P-metric tires.



According to the graph of Maximum Inflation Pressure Vs. Maximum Load, the Pressure Vs. Load line of LT-metric tires is different from P-metric tires (see the following graph). The load capacity is different between LT-metric tires and P-metric tires, and the required inflation pressure is also different between LT-metric tires and P-metric tires when both tire types support the same load.

For example : LT235/75R15 116Q vs. P235/75R15 105S



Therefore, there may be situations where it is not possible to easily replace P-metric O.E. tires with LT-metric tires, and LT-metric O.E. tires with P-metric tires, even though both tires are marked as the same tire size.

We would like to concretely explain the methods to fit tires onto vehicles in such situations.

1) Replacing P-metric O.E. tires with LT-metric tires.

As can be seen in the graph on page 2, LT-metric tires require higher inflation pressures than P-metric tires to carry the same load. As such, LT-metric tires have to be inflated to a higher pressure than that described on the vehicle's Tire Information Placard.

If the above-mentioned rule is not adhered to, the tires will be overloaded and/or underinflated. Regarding the aftermath of this, please refer to the Toyo Tire Talk No.01-005 (TTT-114 Subject : *Inflation Pressure Part 1 - Tire Trouble due to Underinflation*).

To confirm the correct inflation pressure, the Maximum Inflation Pressure / Maximum Load tables in the T.R.A., E.T.R.T.O., JATMA etc. should be used.

Example 1.1 : Replacing P235/75R15 105S with LT235/75R15 104Q.

The vehicle's recommended cold inflation pressure is 240 kPa (35 psi), and maximum tire load requirement is 920 kg (2,028 lbs). The O.E. size is P235/75R15 105S.

It is not possible to support this load by the 104Q LT-metric tire at maximum inflation pressure - 900 kgs (1,984 lbs) at 350 kPa (51 psi). The 104Q has insufficient load capacity at maximum pressure. However, it is possible to support this load by the 110QLT-metric tire at an increased inflation pressure of 400kPa (58psi). (Please refer to the Maximum Inflation Pressure / Maximum Load table below.)

1-08 2001 - THE TIRE AND RIM ASSOCIATION, INC. - 20

"P" TYPE TIRES USED ON PASSENGER CARS AND S
TABLE P-1 TIRE AND RIM ASSOCIATION STANDARDS
 See pages 1-03 thru 1-07 for TIRE SELECTION PROCEDURE.

TIRE SIZE DESIGNATION	TIRE LOAD LIMITS AT VARIOUS COLD INFLATION PRESSURES (kPa)					LOAD INDEX
	STANDARD LOAD					
	kPa	180	200	220	240	
	psi	26	29	32	35	
75 SERIES						
P235/75*15	kg	795	840	880	920	105
	lbs.	1753	1852	1940	2028	

LIGHT TRUCK METRIC TIRES FOR TRUCKS, BUSES, TRAILERS AND MULTIPURPOSE PASSENGER VEHICLES USED IN NORMAL HIGHWAY SERVICE
RADIAL PLY TIRES MOUNTED ON 5° DROP CENTER RIMS
 TIRE AND RIM ASSOCIATION STANDARD

TABLE LTM-3M - S. I. UNITS (continued)

TIRE SIZE DESIGNATION	USAGE	TIRE LOAD LIMITS (kg) AT VARIOUS COLD PRESSURES (kPa)						
		250	300	350	400 (58psi)	450		
70 SERIES (CONTINUED)								
LT235/75R15	DUAL	645	735	825 (C) ¹⁰¹	900	975 (D) ¹⁰⁷	1060	1150 (E) ¹¹³
	SINGLE	710	810	900 (C) ¹⁰⁴	990	1060 (D) ¹¹⁰	1160	1250 (E) ¹¹⁶

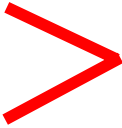
(2,183lbs)

2) Replacing LT-metric O.E. tires with P-metric tires.

When P-metric tires are to be fitted onto a vehicle that has LT-metric tires fitted as O.E., the load capability of the P-metric tire must be checked to determine if the tire has sufficient capacity at the maximum inflation pressure for the P-metric tire.

The load capacity of P-metric tires become 91% of their normal capability when fitted to vehicles which have LT-metric tires fitted as O.E.. This is due to LT-metric tires being designed more strongly than P-metric tires (refer to : 2001 Tire & Rim Association Inc. Handbook, page 2-03 : Tire Selection).

If P-metric tires with 91% of their standard load capability can cover the required load capacity of the vehicle, as described on the Tire Information Placard, then the P-metric tires are able to replace the O.E. LT-metric tires.



I'm a P-metric tire. My load capability becomes 91% of the normal ability when I'm fitted onto a vehicle which has LT-metric tires fitted as O.E. I am not equal to a LT-metric tire.

The following are practical examples.

Example 2.1 : Replacing LT245/75R16 108Q with P245/75R16 109S.

The vehicle's recommended cold inflation pressure maximum is 310 kPa (45 psi), and maximum tire load requirement is 920 kgs (2,028 lbs). The O.E. tyre is LT245/75R16 108Q.

The load rating of 109 equates to a load capacity of 1,030 kgs (2,271 lbs). The 91% load capability of the P245/75R16 109S is 937 kgs (2,066 lbs) - 91% of 1,030 kgs. This 91% load capability is above the vehicle's maximum requirement of 920 kgs. Therefore, it is possible to replace LT245/75R16 108Q with the P245/75R16 109S size.

LIGHT TRUCK TIRE SIZES

	20	25	30	35	40	45	50
LT245/75R16				1700	1865	2030	(C)2205

PASSENGER TIRE SIZES

	24	25	26	27	28	29	30	31	32	33	34	35
P245/75R16			1962	1995	2028	2072	2105	2138	2172	2205	2238	2271
91% load capacity			1785	1815	1845	1886	1916	1946	1977	2007	2037	2067

Example 2.2 : Replacing LT265/75R16 112Q with P265/75R16 114S.

The vehicle's recommended cold inflation pressure is 345 kPa (50 psi), and maximum tire load requirement is 1,120 kgs (2,470lbs). The O.E. tire size is LT265/75R16 112Q.

The load rating of 114 equates to a load capacity of 1,180 kgs (2,601 lbs). The 91% load capability of the P265/75R16 114S is 1,074 kgs (2,367 lbs). This 91% load capability of the P265/75R16 114S is below the requirement of 1,120 kgs. As such it is not possible to replace LT265/75R16 112Q tire size with the P265/75R16 114S tire size.

LIGHT TRUCK TIRE SIZES

	20	25	30	35	40	45	50
LT265/75R16			1715	1910	2095	2280	(C)2470

PASSENGER TIRE SIZES

	24	25	26	27	28	29	30	31	32	33	34	35
P265/75R16			2249	2282	2326	2370	2414	2447	2491	2535	2568	2601
91% load capacity			2047	2077	2117	2157	2197	2227	2267	2307	2337	2367

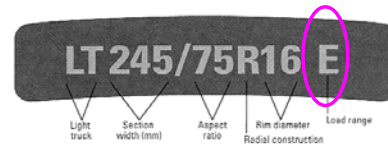
Note : The load capacity of LT-metric tires can be marked by Load Range***, Ply Rating or Load Index.

For example : LT235/75R15

Load Range "C" = 6P.R. = Load Index "104"

Load Range "D" = 8P.R. = Load Index "110"

Load Range "E" = 10P.R. = Load Index "116"



*** Load Range is ...

A system of alphabetic designation identifying the carrying capacity range of a tire. This system was established by the RMA (Rubber Manufacturers Association).

P-Metric Tire	Load Range	Ply Rating
	Standard Load	-
Extra Load	-	
Light Truck Tire	B	4
	C	6
	D	8
	E	10
	F	12

LT-metric tires with Load Range "D" (e.g. LT235/75R15 L.R. D = Load Index 110) and Load Range "E" (e.g. LT235/75R15 L.R. E = Load Index 116) cannot be replaced with P-metric tires, as the P-metric tires do not have sufficient load capability to meet the required load capacities of these "D" and "E" load rated tires.

- a) There is no necessity that P-metric tires and LT-metric tires be interchangeable.
(Please refer to page 2).
- b) If P-metric O.E. tires are replaced with LT-metric tires, the LT-metric tires require a higher cold inflation pressure than that on the vehicle's Tyre Information Placard.
(Please refer to page 3).
- c) If LT-metric O.E. tires are replaced with P-metric tires, the load capability of the P-metric tires becomes 91% of the normal P-metric capability. Therefore, confirmation of whether the 91% load capability of the P-metric tire can cover the load capacity stated on the vehicle's Tyre Information Placard is required.
(Please refer to pages 4 & 5).
- d) If P-metric O.E. tires are replaced with LT-metric tires, the additional inflation requirement may cause unacceptable vehicle ride and handling qualities.

LT-metric tires are mainly suitable for heavy duty commercial use, the exception being "flotation" type light truck tires.

