FEDERAL ROAD SAFETY CORPS

TYRES: THE MOST OVERLOOKED SAFETY FEATURE

A PRESENTATION

BY

ACM kayode OLAGUNJU (Ph.D)

HEAD, POLICY, RESEARCH AND STATICTICS DEPARTMENT.

AT THE CAPACITY BUILDING WORKSHOP FOR ZONAL AND SECTOR HEADS OF OPERATIONS AT THE FRSC ACADEMY , UDI, ENUGU STATE

12, May 16

WHERE IT ALL BEGAN

In 1888, Dunlop's founder, John Boyd Dunlop, was watching his young son riding his tricycle on solid rubber tyres over cobbled ground. He noticed that his little boy was not going very fast and did not seem very comfortable. In trying to provide his son with a smoother ride and better handling, Dunlop took the tricycle, wrapped its wheels in thin rubber sheets, glued them together and inflated them with a football pump. That way he developed the first air cushioning system in history, and laid the foundation for the first pneumatic tyre.

TYRE

A rubber covering, typically inflated or surrounding an inflated inner tube, placed round a wheel to form a soft contact with the road. May have about 23- 35 different components held together to deliver on performance expectations.

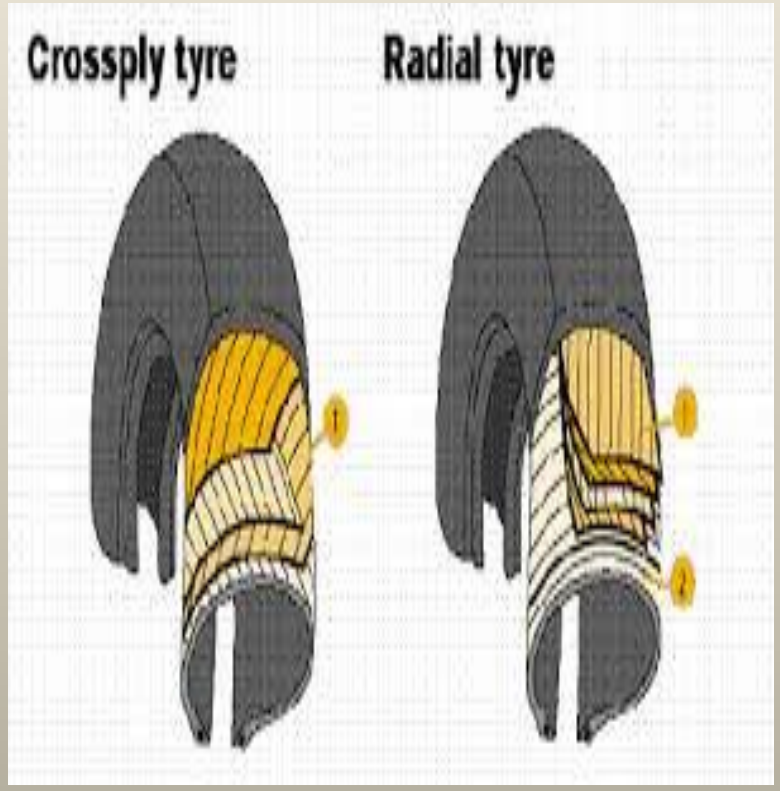
RADIAL TYRE

They are flexible tyre, which is able to absorb shocks generated by road surface. This tyre is also stronger, which enables vehicle to operate at higher capacities.

CROSS-PLY TYRE

The cross-ply tyre has a rigid sidewall. This rigid sidewall prevents heat dissipation and consequently leads to faster tread wear. Also, they do not have very high speed rating.

Please Note that; Tubeless tyres must only be fitted on rims specifically designed for the purpose



In cross-ply, the fabric plies (1) cross over each other at the same angle.

In radial tyre, the bolt (1) and the casing plies(2) overlap at different angles.

LIFE SPAN OF A TYRE

If a tyre is used carefully, after two years the tyre loses about 20% of its quality and when it reaches the 3rd year, it loses about 50%. An appropriate life span for tyre replacement is thus 4 years from the Date of Manufacture (DOM), unless worn down earlier by damage, alignment problems or high mileage coverage. Poor alignment of tyre and unbalanced wheel reduce the tyre life span. ***DO NOT USE "TOKUNBO" TYRES, THEY ARE EXPIRED AND COULD BE MORE EXPENSIVE ON THE LONG RUN.***

NOTE!

It is advisable that tyre should be replaced after covering a maximum of 80,000 km, even if the four (4) years life span is yet to be met. When changing some tyres of the vehicle, it is advisable to fix the new ones on the rear axle. New tyre on the rear axle provide better handling, wet grip, and evacuate water, which help to avoid over- steer and loss of vehicle stability on wet surfaces.

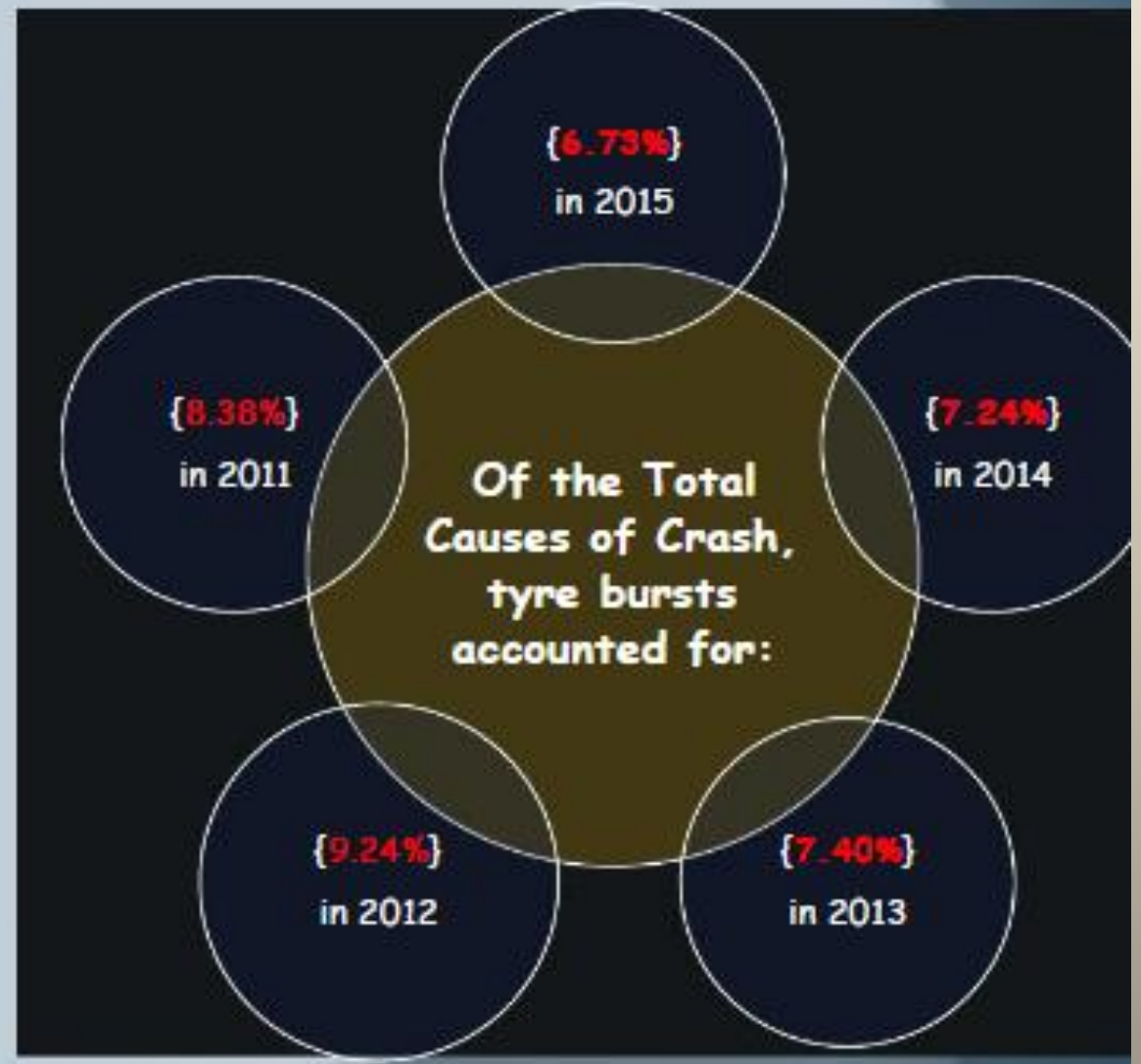
FACTS !

- Inflation irregularities account for 78% of tyre maintenance problems
- Only 2% of tyres get worn to the grooves.
- 7% due to other abnormal wear
- 6% due to Injury by obstacles
  7% are due to other reasons
- Tyre loses 2psi monthly. Check your tyre pressure regularly

A damaged Tyre

Tyre related crashes

According to available data.....



PEOPLE COMPLAIN THAT NEW TYRES ALSO BURST!

But why would new tyres burst within weeks of their purchase?

It could be due to the fact that they had exceeded their life span. People could buy new tyres that have expired and face the same risk associated with the use of second-hand tyres.

When unused tyres are stored in bad conditions, or when a car is parked permanently for a long time, the tyre becomes weakened and susceptible to burst on motion. Likewise, countries with varying weathers, bad roads and especially hot and moist lands all hasten wear and tear. It is advisable therefore to suspend tyres in the air when a car is not in use for a long time.

HOW TO KNOW THE EXPIRY DATE OF A TYRE

Several people today use vehicles but don't know much about them, this includes the expiration date of their vehicle tyre thereby exposing them to risk. Tyre expiration date is usually indicated on the side walls. It comes in four digits, indicating the week and year of manufacture e.g. *0510* or sometimes it comes with pre-alphabet letters e.g. (*PHN0510*). The first two of the four-digit numbers on the round-ended box shows the week the tyre was manufactured while the last two digits represent the year.

So, if the numbers are *0510* it means that the tyre was manufactured in fifth week of the year 2010; that is, first week of February. If your tyre is printed with only a 3-digit number, it means such tyre was manufactured before 2000 and should be replaced immediately as it is older than 4 years and could burst at any time because it has expired, no matter how good looking it is.

ANALYSIS OF SURVEY ON TYRE

Command	Tyre Parameters									
	Expired		Purchased As			Correct Tyre Pressure		Thread/Grip Level		
	Yes	No	New	Re-bore	Tokunbo	Yes	No	Good	Fair	Bad
RS1.1	308	276	324	66	194	316	268	400	159	144
RS1.2	132	348	164	30	86	176	304	190	68	76
RS1.3	8	64	52	0	20	44	28	52	20	0
RS1.4	40	108	120	6	22	108	40	120	27	12
RS2.1	124	1108	1108	0	124	984	248	1048	184	0
RS2.2	188	244	268	28	136	188	244	267	146	40
RS3.1	0	0	0	0	0	0	0	0	0	0
RS3.2	16	24	28	4	8	36	4	24	4	12
RS3.3	0	0	0	0	0	0	0	0	0	0
RS4.1	96	76	92	24	56	108	64	122	45	48
RS4.2	208	384	408	36	148	444	148	430	155	72
RS4.3	59	341	323	0	77	287	113	318	60	22
RS5.1	188	144	176	36	120	200	132	222	95	80
RS5.2	805	551	537	48	771	685	671	1130	182	131
RS5.3	208	264	305	18	149	200	272	374	80	51
RS6.1	0	0	0	0	0	0	0	0	0	0
RS6.2	547	365	207	30	675	462	450	685	203	78
RS6.3	113	135	118	6	124	106	142	149	62	48
RS6.4	94	126	147	12	61	135	85	133	65	43
RS7.1	110	218	211	5	112	169	159	215	90	23
RS7.2	48	112	124	0	36	108	52	104	48	8

RS8.1	161	159	182	24	114	208	112	211	93	59
RS8.2	48	52	72	6	22	52	48	56	23	32
RS8.3	216	144	180	54	126	216	144	248	101	108
RS9.1	168	192	203	30	127	195	165	251	103	60
RS9.2	96	64	80	24	56	96	64	110	45	48
RS9.3	8	8	16	0	0	4	12	10	5	1
RS9.4	216	120	185	30	121	224	112	236	81	73
RS10.1	94	198	214	0	78	203	89	162	114	16
RS10.2	72	88	99	18	43	112	48	121	36	36
RS10.3	12	68	56	0	24	12	68	44	36	0
RS11.1	169	99	135	30	103	167	101	166	86	70
RS11.2	280	128	196	30	182	280	128	218	136	108
RS11.3	34	26	29	0	31	0	60	24	27	9
RS12.1	66	94	98	12	50	116	44	119	30	32
RS12.2	4	32	36	0	0	36	0	32	4	0
RS12.3	0	24	24	0	0	24	0	24	0	0
Total	4936	6384	6517	607	3996	6701	4619	8014	2613	1540

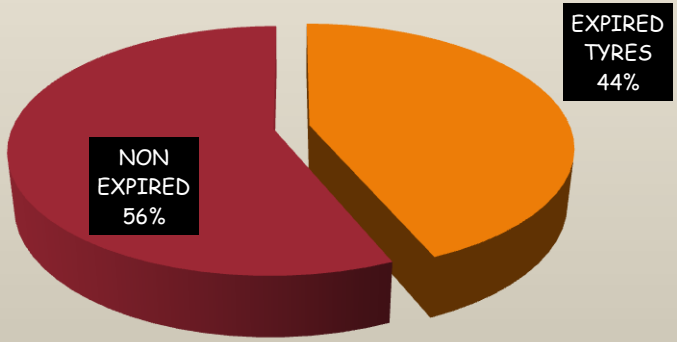
Command	Burge on Tyre		Worn out Tyre		Driver Aware of Tyre Expiration	
	Yes	No	Yes	No	Yes	No
RS1.1	44	540	52	532	91	55
RS1.2	26	254	26	254	49	21
RS1.3	24	48	24	48	15	3
RS1.4	4	144	4	144	21	16
RS2.1	124	1108	368	864	231	77
RS2.2	43	389	59	373	35	73
RS3.1	0	0	0	0	0	0
RS3.2	12	28	12	28	8	2
RS3.3	0	0	0	0	0	0
RS4.1	14	158	18	154	23	20
RS4.2	46	546	26	566	77	71
RS4.3	20	380	35	365	41	59
RS5.1	22	310	46	286	44	29
RS5.2	76	1280	308	1048	153	186
RS5.3	42	330	62	410	67	51
RS6.1	0	0	0	0	0	0
RS6.2	58	854	338	574	153	44
RS6.3	27	221	46	202	45	17
RS6.4	19	201	13	207	52	20
RS7.1	13	315	28	300	38	44
RS7.2	8	152	72	88	21	19

RS8.1	35	285	35	285	32	48
RS8.2	8	92	8	92	11	14
RS8.3	32	328	32	328	50	40
RS9.1	28	332	34	326	63	27
RS9.2	14	146	14	146	28	12
RS9.3	0	16	0	16	0	4
RS9.4	22	314	66	270	52	32
RS10.1	0	292	0	292	9	64
RS10.2	13	147	11	149	20	20
RS10.3	8	72	8	72	6	14
RS11.1	30	238	33	235	47	20
RS11.2	190	208	138	270	78	24
RS11.3	8	52	8	52	10	5
RS12.1	15	125	15	125	31	9
RS12.2	0	36	8	28	2	7
RS12.3	0	28	8	20	6	0
Total	1024	9970	1954	9150	1609	1147

VEHICLES WITH EXPIRED TYRES

	FREQUENCY	PERCENTAGE
EXPIRED TYRES	4936	44%
NON EXPIRED	6384	56%
Total	11320	100%

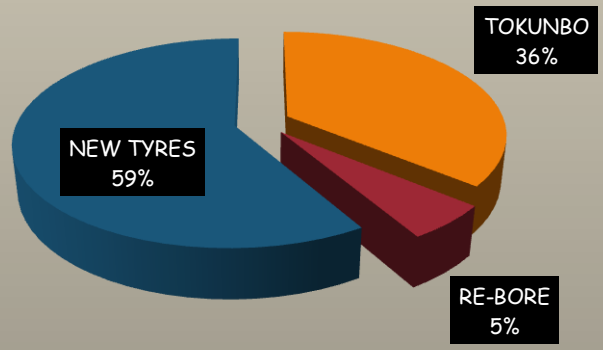
NUMBER OF EXPIRED TYRES



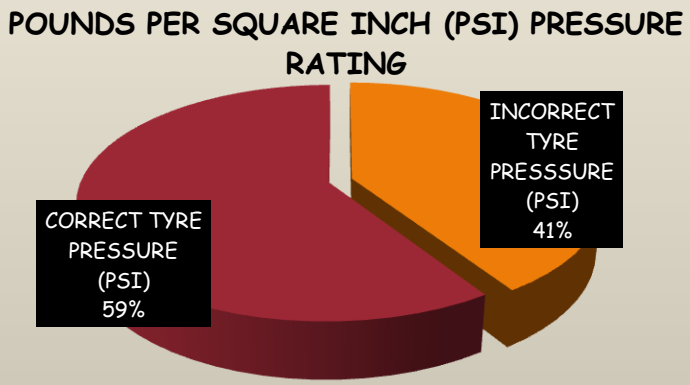
THE TYRE WAS PURCHASED AS

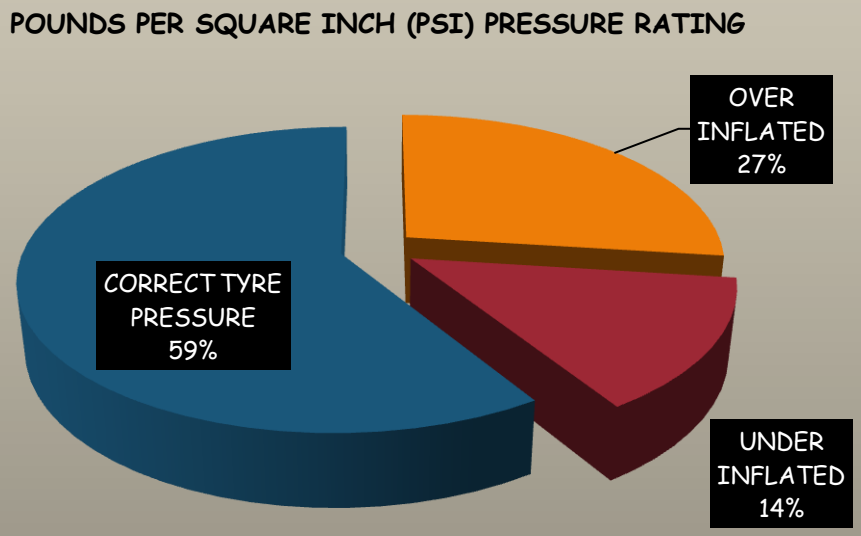
	FREQUENCY	PERCENTAGE
TOKUNBO	3996	36%
RE-BORE	607	5%
NEW TYRES	6517	59%
Total	11120	100

THE PERCENTAGE OF VEHICLES USING TOKUNBO,RE-BORE AND NEW TYRES

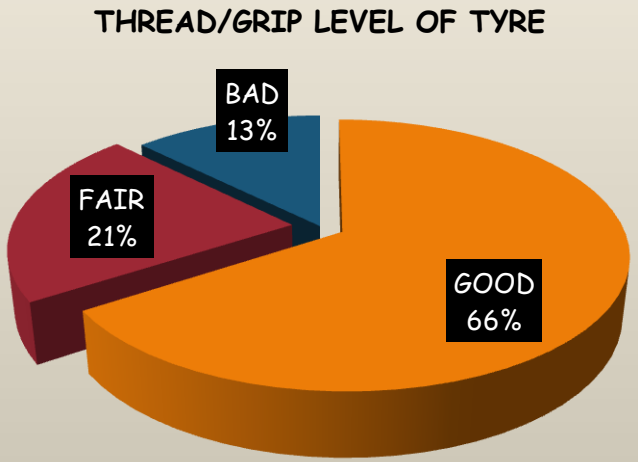


POUNDS PER SQUARE INCH (PSI) PRESSURE RATING		
	FREQUENCY	PERCENTAGE
INCORRECT TYRE PRESSSURE (PSI)	4619	41%
CORRECT TYRE PRESSURE (PSI)	6701	59%
Total	**11320**	**100%**

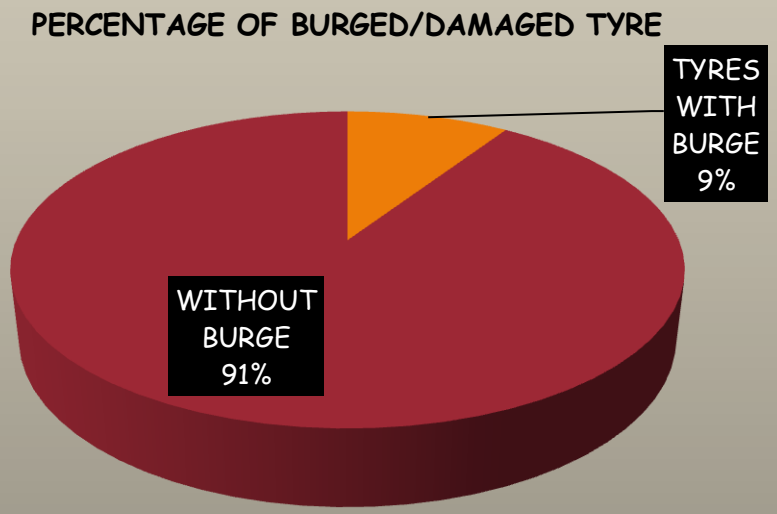




THREAD/GRIP LEVEL OF TYRE		
	FREQUENCY	PERCENTAGE
GOOD	8014	66%
FAIR	2613	21%
BAD	1540	13%
Total	**12168**	**100%**

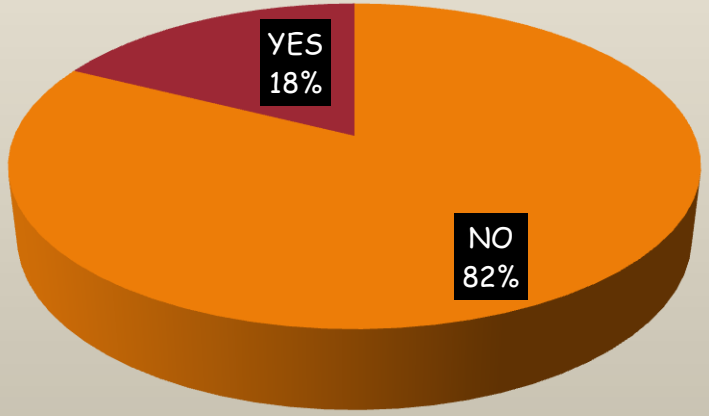


PERCENTAGE OF BURGED/DAMAGED TYRE		
	FREQUENCY	PERCENTAGE
TYRES WITH BURGE	1024	9%
WITHOUT BURGE	9970	91%
Total	**10994**	**100%**



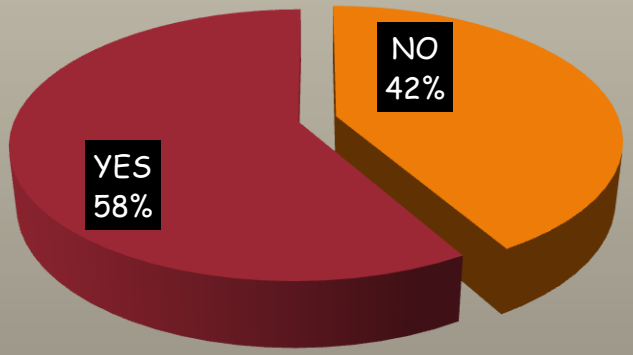
NUMBER OF WORN OUT TYRES		
	FREQUENCY	PERCENTAGE
NO	9150	82%
YES	1954	18%
Total	**11104**	**100%**

NUMBER OF WORN OUT TYRES



DRIVERS WITH KNOWLEDGE OF TYRE EXPIRATION		
	FREQUENCY	PERCENTAGE
NO	1147	42%
YES	1609	58%
Total	**2756**	**100%**

PERCENTAGE OF
DRIVERS WITH KNOWLEDGE OF TYRE EXPIRATION



TYRE PRESSURE

Maintaining the correct tyre pressure will help to extend the life of your tyre, improves vehicle safety and maintains fuel efficiency.

Tyre pressure is measured by calculating the amount of air that has been pumped into the inner lining of tyre in Pounds Per Square Inch (PSI) or BAR pressure.

Vehicle manufacturers usually specify the suitable pressure for the various sizes of tyre; and it is your responsibility as the driver to make sure that the recommended pressure is checked and maintained on a regular basis. Tyre loses 2psi monthly. This is recommended to be done every two weeks to ensure optimum tyre pressure and performance. YOU CAN FIND THE INFORMATION ON TYRE PRESSURE (PSI) WRITTEN ON THE FRAME OF THE DRIVER DOOR

TYRE PRESSURE GUAGE- NON CALIBRATED EQUIPMENT

GIVING WRONG READINGS. POOR KNOWLEDGE OF MANY VULCANIZERS

PROPER INFLATION – Tyres are designed to carry loads up to the maximum specified at the inflation pressure for a desired deflection, road contact and tread wear. Any neglect of the recommended inflation pressure may result to one or more of serious tyre failures or loss of tyre life potency.

Load carrying capacity of a tyre cannot be increased above the maximum rated capacity, by merely increasing its inflation pressure. To do this, is to over inflate.

OVER INFLATION - Over inflated tyre does not flex as designed, or absorb shocks, they are more prone to cuts, concussion, snags and rapid centre wear.

UNDER INFLATION – Under inflation results in excessive flexing of tyre, excessive heat generation and rapid shoulder wear.

INFLATION TIPS

- Never “bleed” or reduce air pressure when tyres are hot.

- A car loses up to 2 psi each month and 2 psi for every 10 degrees temperature drop according to Rubber manufacturer’s association, U.S

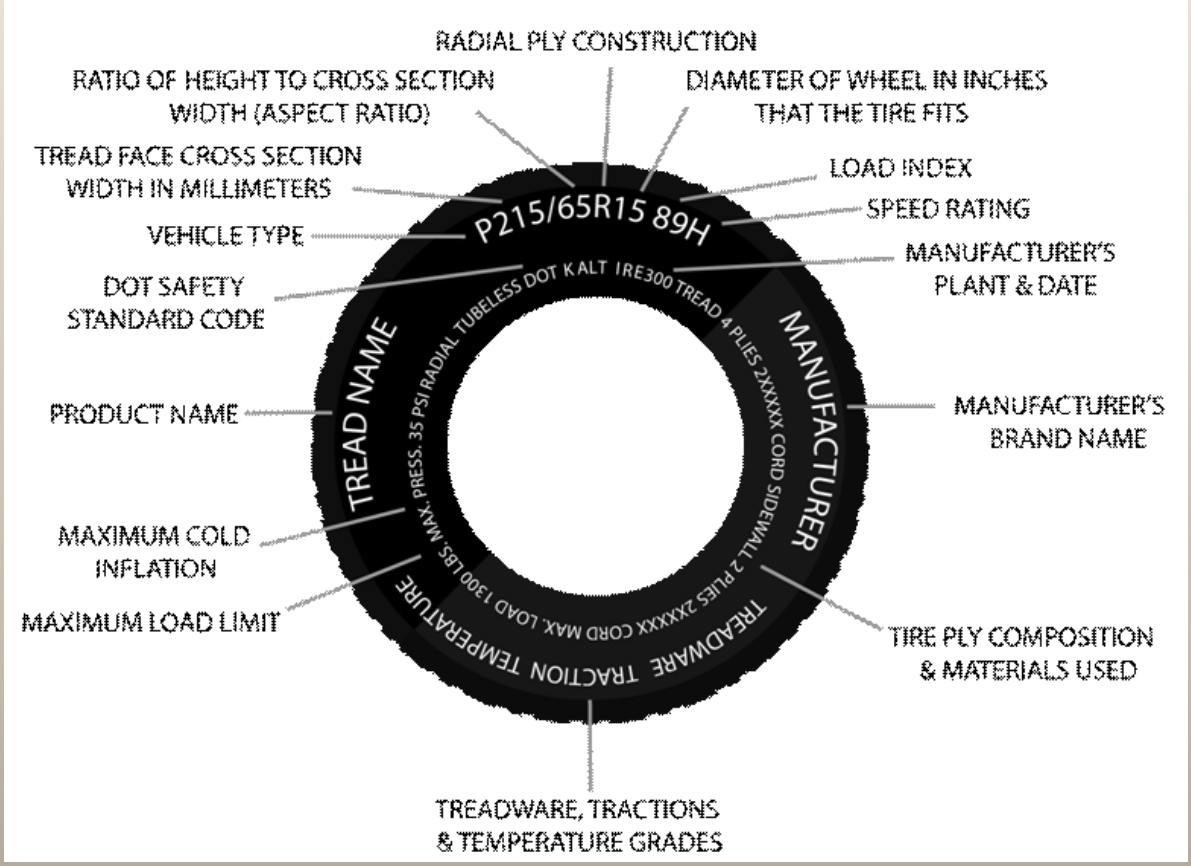
- Under inflation can lead to tyre blow out.

- Make sure all tyre/tube valves are equipped with valve caps to keep dirt and moisture away.

- Under inflation or overloading creates excessive deflection and hence heat, which can lead to faster tyre wear and premature failures. This could result in vehicle instability causing damage to property, serious injury or death. Appropriate inflation optimizes tyre life span and saves fuel consumption as well.

It is the drivers responsibility to ensure that the tread on the tyre is not worn beyond the legal minimum limit of 1.6millilters. Check the Tread Wear Indicator(TWI) which is at a level of 1.6mm on the tyre.

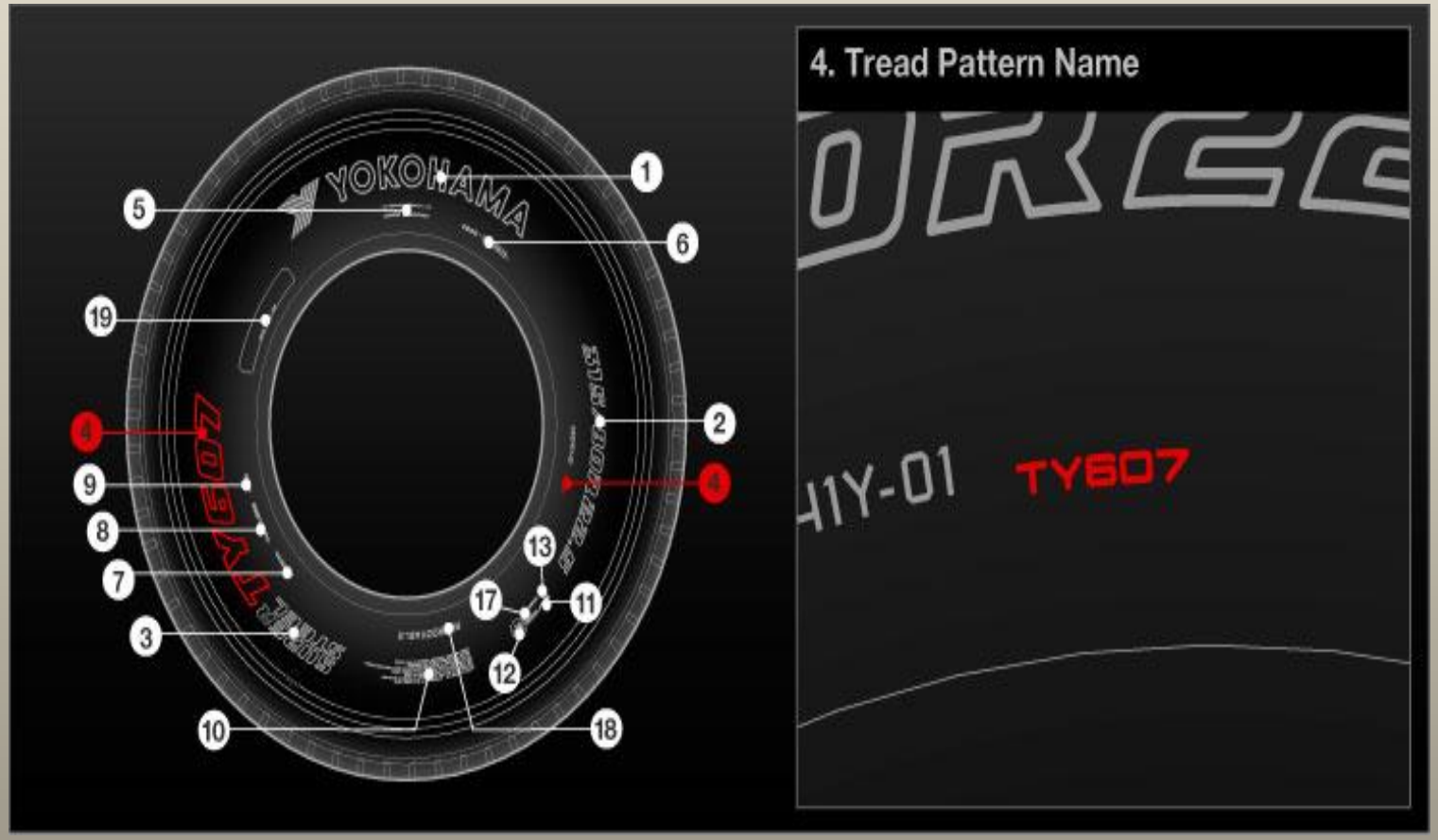
TYRE SIDEWALL MARKINGS



TYRE MARKINGS

Understanding the tyre markings such as R, SR, HR for all radial tyres and S, H, V for diagonal or Ply tyres, for the size , marking/ speed rating in the services description. 185R14 tyre connotes that the width of the tyre is 185 cm and the rim diameter is 14

SIDEWALL MARKINGS II



TYRE SIZE

Your tyre size is found on the sidewall of your current tyre and is a sequence of numbers and letters. There are many variations so it's important to check your existing tyre or to check your vehicle manual to ensure the right tyre size has been installed.

TYRE WIDTH

The first three digits. This displays the width of the tyre in millimetres. A tyre marked 225 will measure 225mm across the tread from sidewall to sidewall.

ASPECT RATIO

The fourth and fifth digits of the tyre code that immediately follow the tyre width. The aspect ratio or profile height of the tyre sidewall is expressed as a percentage of the tyre width. So an aspect ratio of 55 for example means that the profile height of the tyre is 55% of its width.

WHEEL DIAMETER

The next two digits represent the size of the wheel rim that the tyre can be fitted to. It is also the diameter of the tyre from bead to bead. So a tyre marked 16 will fit on a 16-inch wheel rim

LOAD INDEX

The load index provides information on the maximum weight capability for the tyre. The load index is a numerical code that can be located just after the tyre size marking and before the speed rating.

TYRES LOAD CARRYING CAPACITY

LOAD INDEX	POUNDS	KG	LOAD INDEX	POUNDS	KG
71	761	345	99	1709	775
72	783	355	100	1764	800
73	805	365	101	1819	825
74	827	375	102	1874	850
75	853	387	103	1929	875
76	882	400	104	1984	900
77	908	412	105	2039	925
78	937	425	106	2094	950
79	963	437	107	2149	975
80	992	450	108	2205	1000
81	1019	462	109	2271	1030
82	1047	475	110	2337	1060
83	1074	487	111	2409	1095
84	1102	500	112	2484	1129
85	1135	515	113	2561	1164
86	1168	530	114	2640	1200
87	1201	545	115	2721	1237
88	1235	560	116	2806	1275
89	1279	580	117	2892	1315
90	1323	600	118	2982	1355
91	1356	615	119	3074	1397
92	1389	630	120	3169	1440
93	1433	650	121	3267	1485
94	1477	670	122	3368	1531
95	1521	690	123	3472	1578
96	1565	710	124	3580	1627
97	1609	730	125	3690	1677
98	1653	750	126	2271	1030

LOADING PATTERN

- Load spread affects tread wear .
- Load trailer evenly to avoid unnecessary overload on any of the tyre positions.
- A tyre loss in a twin tyre assembly can lead to the loss of the twin.
- Speed affects Load carrying capacity
- At higher speeds tyre load carrying capacity reduces.
- At lower speeds tyre can carry higher loads

ESSENTIAL ECONOMIC TIPS

- Tyre and Fuel account for a significant cost of vehicle operations. Any saving can be substantial.
- Load Inflation matching….
- Tread Pattern and positioning
- Road condition/driving terrain/speed rating guide
- Up to 21% of revenue can be lost to improper tyre maintenance.
- As much as 10% savings can be achieved by instituting Inflation monitoring system alone.

  Fuel consumption drops

  Driver's Fatigue drops

  Tyre tread life will be extended

IMPORTED USED/SUBSTANDARD TYRES (SON)

Improving life through Standards

USED TYRES

- From country of origin are rejects – classified by legislation as "OFF THE ROAD". They exhibit bad water dispersal, poor temperature (more than C), poor traction, cannot withstand pressure and the like (Deformed)
- Cheap but dangerous (time-bomb)

SUBSTANDARD TYRES

- Aged Tyres > 5yrs
- Animal Driven Vehicle Tyres (ADV)
- Below International Standards
- Display of cracks, blisters, chunks e.t.c

SPEED RATING

The speed rating of a tyre is represented by a letter of the alphabet at the end of the tyre size code and indicates the maximum speed capability of the tyre. Tyres receive a speed rating based on a series of tests which measure the tyres capability to handle a set speed for a prolonged period of time.

TYRE SPEED RATINGS		
SPEED SYMBOL	MAX. SPEED (KM/H)	MAX. SPEED (M/PH)
Q	160	100
R	170	106
S	180	112
T	190	118
U	200	124
H	210	130
VI	220+	130+
V	240	149
W	270	168
Y	300	186
Z	300+	186+

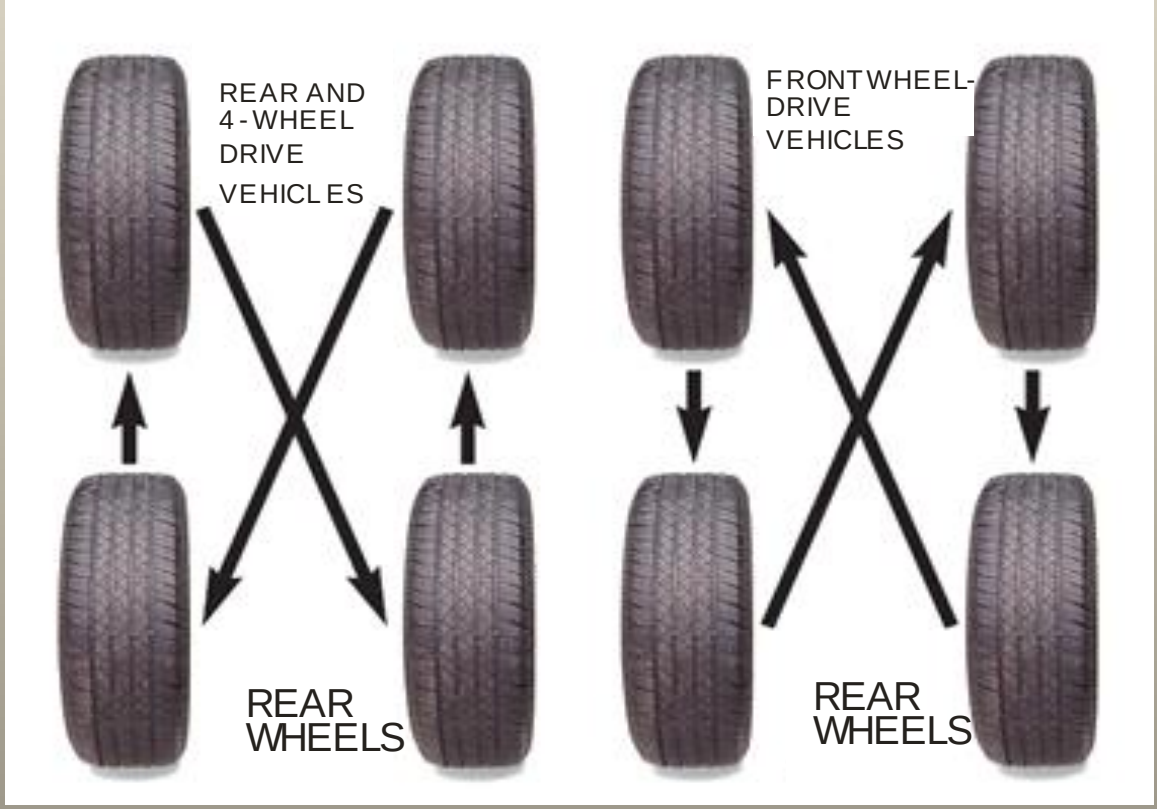
Although not illegal, it is not advisable to have tyres with a lower speed rating or load index than the manufacturer recommended tyre specification for your vehicle, or to have a combination of different tyre construction types. Check your vehicle manual to confirm your vehicle's tyre speed rating and load index as well as any additional requirements.

PLY RATING IDENTIFIES A TYRE WITH ITS MAXIMUM RECOMMENDED LOAD.

Heat Resistance- Letter "A", "B", or "C" on tyre side wall indicates its rate of resistance to heat. "A" is the most heat resistant tyre while "C" is the lowest. "A" tyre is best suited for a tropical country like Nigeria. "C" is okay for a temperate (cold) regions.

TYRE ROTATION

Regular rotation helps extend the life span of tyre and improves its performance



TIPS IN CASE OF TYRE BLOW-OUT ON MOTION

- Do not panic
- Remove your leg from the accelerator pedal to reduce speed
- Hold your steering firmly with your two hands
- Do not apply brake
- Be alert and conscious of the environment after the speed has been drastically reduced, gradually bring the vehicle to a stop and park safely.

In conclusion, the resultant effect of good engine and motion, all depend on tyres and other chassis system. Special attention should be given to the tyre maintenance always.
Vehicle contact with the road is through the tyre, check your tyre always.

HIGH SPEED COMPOUNDS PROBLEMS ASSOCIATED WITH BLOW OUT TYRES, KEEP TO THE SPEED LIMITS ALWAYS.

THANK YOU