

Tire Basics Chapter 2



Chapter 1 Review

- Identify the physical characteristics of a tire
 - Tread, bead, and sidewall
- Understand the tire size
 - How to read the size and what each measurement means
- Information found on the sidewall
 - Size, DOT Identification Code, and Brand
- Brands of tires sold at The Tire Rack

Advanced Tire Training

- Detailed information found on the sidewall of the tire
- Performance characteristics of certain tire types
- Visual recognition of brands, models, and tread styles
- Breaking down The Tire Rack part number
- Understanding tire information and description codes on our labels.

Service Description

- The Service Description identifies the tire's load index and speed rating.
- The first two digits (**91**) represent the load index.
- The third character is a single letter (**H**) that identifies the speed rating.
- The service description can be found on the sidewall of the tire, directly after the size.
- Service descriptions are required on all speed rated tires; except for tires with a Z-rating.



Service Description- Load Index

- The load index identifies the maximum load the tire is capable of carrying.
- The higher the tire's load index number, the greater its load carrying capacity.
- Example: Load index 91= 1356lbs or 615kgs

Load Index	Pounds	Kilograms	Load Index	Pounds	Kilograms
71	761	345	91	1356	615
72	783	355	92	1389	630
73	805	365	93	1433	650
74	827	375	94	1477	670
75	853	387	95	1521	690
76	882	400	96	1565	710
77	908	412	97	1609	730
78	937	425	98	1653	750
79	963	437	99	1709	775
80	992	450	100	1764	800
81	1019	462	101	1819	825
82	1047	475	102	1874	850
83	1074	487	103	1929	875
84	1102	500	104	1984	900
85	1135	515	105	2039	925
86	1168	530	106	2094	950
87	1201	545	107	2149	975
88	1235	560	108	2205	1000
89	1279	580	109	2271	1030
90	1323	600	110	2337	1060

Load Index- Light Truck Tires

- Light truck tires that are designed to be used on vehicles that are capable of carrying heavy cargo or towing large trailers can have two different numbers that describe its load index.
- The example below is a tire that will have two different numbers that identify the load index, **123** and **120**. The two numbers are used when the tires are installed on a dual rear axle truck (dually).
- 123 is the load index if the tire is installed on a single rear axle.
- 120 is the load index if the tire is installed on a dual rear axel.

Item Number	675QR6GRHTSOWL	Status:	ACTIVE
Description	LT265/75R16~GE~GRAB HTS OWL E		
	0457043	123/120Q	E
Vendor Item#:	04570430000		
Tire Type	: GRABHTS	Item Class:	20 General
Ship Weight	: 47.000	FET	.00

Service Description- Speed Rating

- The speed rating of a tire describes how fast the tires can safely rotate.
- Speed ratings were established to match the speed capability of tires with the top speed capability of the vehicle to which they are applied.
- The chart below shows the most common speed rating symbols, maximum speeds, and typical applications.

	MAXIMUM SPEED		TYPE / VEHICLE TYPE	
L		75 mph 120 km/h		Off-Road & Light Truck Tires
M		81 mph 130 km/h		Temporary Spare Tire
N		87 mph 140km/h		Temporary Spare Tires
Q		99 mph 160 km/h		Winter 4x4
R		106 mph 170 km/h		Heavy Duty Light Truck
S		112 mph 180 km/h		Family Sedans & Vans
T		118 mph 190 km/h		Family Sedans & Vans
U		124 mph 200 km/h		Sedans & Coupes
H		130 mph 210 km/h		Sport Sedans & Coupes
V		149 mph 240 km/h		Sports Cars
Z		149+ mph 240+ km/h		Sports Cars
W		168 mph 270 km/h		Exotic Sports Cars
Y		186 mph 300 km/h		Exotic Sports Cars
(Y)		186+ mph 300+ km/h		Exotic Sports Cars

Service Description- Speed Rating

- Tire speed ratings range from A (the lowest) to Y (the highest). The chart of speed ratings is not in alphabetical order as the maximum vehicle speeds have continued to increase over the years.
 - Speed ratings make a difference not only in regards to speed, but in regards to ride comfort, wear, and cornering ability. Typically, the higher the speed rating, the better the grip and stopping power, but the lower the tread life.
-
- Z rated tires were once the highest rated tires at 149+ mph.
 - W and Y were added to the chart to keep up with the increased speeds of exotic sports cars at 186 mph.
 - (Y) rating was added recently for vehicle speeds over 186 mph. The parenthesis around the Y indicates that the tire has been tested in excess of 186 mph.

	MAXIMUM SPEED		
L		75 mph	120 km/h
M		81 mph	130 km/h
N		87 mph	140km/h
Q		99 mph	160 km/h
R		106 mph	170 km/h
S		112 mph	180 km/h
T		118 mph	190 km/h
U		124 mph	200 km/h
H		130 mph	210 km/h
V		149 mph	240 km/h
Z		149+ mph	240+ km/h
W		168 mph	270 km/h
Y		186 mph	300 km/h
(Y)		186+ mph	300+ km/h

Load Range-Passenger Tires

- The load range helps identify how much load the tire is designed to carry at its specified air pressure.
- Load ranges are used to separate tires that share the same physical size and load index, but differ in strength due to their internal construction.
 - ‘Higher’ load ranges identify tires that have a stronger internal construction, and therefore can hold more air pressure and carry more weight.
- Passenger tires feature named load ranges:
 - Light Load- Passenger tires manufactured in ‘Light Load Ranges’ will be branded as Light Load, and identified by an LL in the description.
 - EX: P285/35R19 LL
 - Standard Load- Most passenger tires are manufactured in ‘Standard Load Ranges’ so they will rarely have a standard load marking branded on the sidewall.
 - Extra Load/Reinforced- Passenger tires manufactured in ‘Extra Load Ranges’ will be branded with the words “Extra Load” or “Reinforced” on the sidewall. They may also be identified on the sidewall by an XL or RF.

P-Metric Passenger Vehicle Tires		
Load Ranges	Abbreviated	Max Load Pressure
Light Load	LL	35 psi
Standard Load	Nothing or SL	35 psi
Extra Load	XL/RF	41 psi

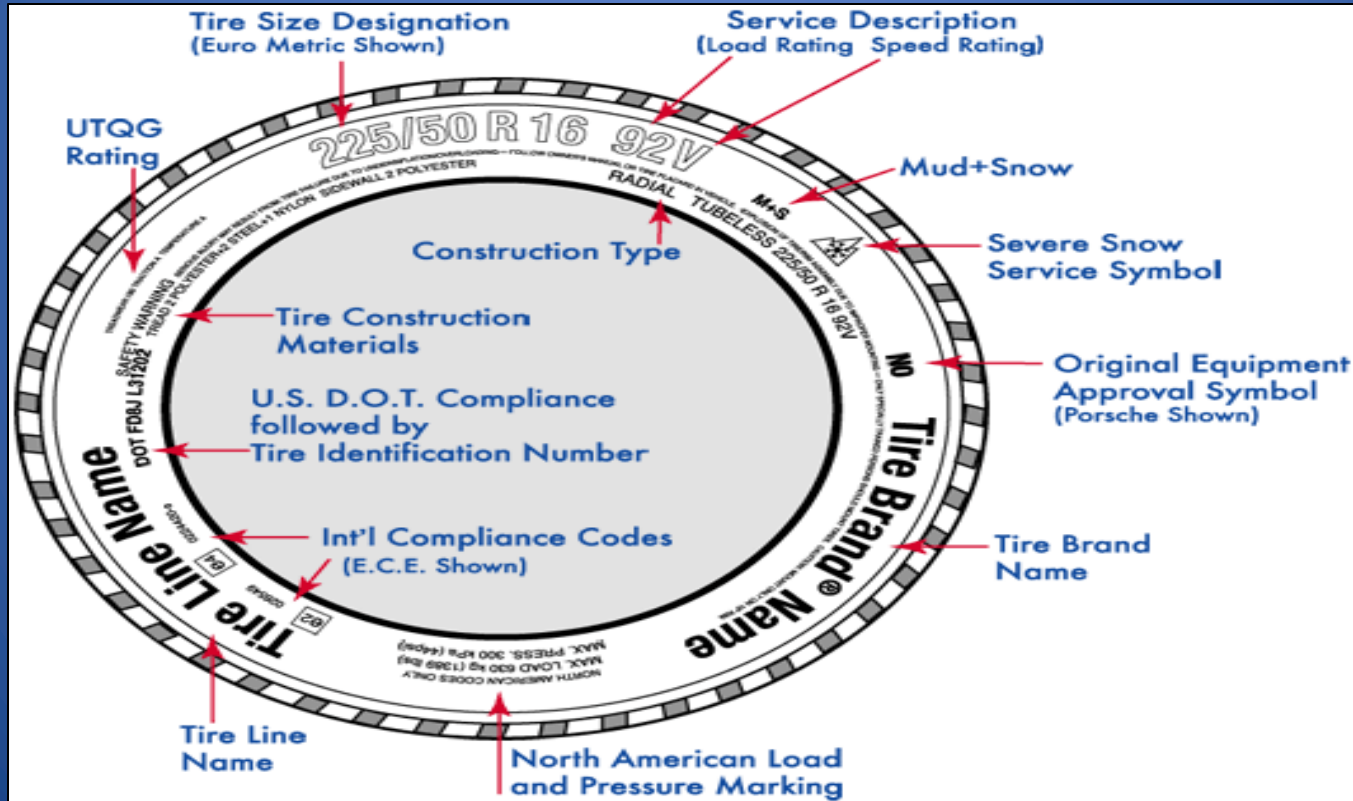
Load Range-Light Truck Tires

- The load range helps identify how much load the tire is designed to carry at its specified air pressure.
- Light Truck tires use load ranges organized in alphabetical order.
 - Letters further along in the alphabet identify stronger tires that can withstand higher inflation pressures and carry heavier loads.
 - The Load Range letter corresponds with the strength/number of internal plies of rubber and fabric used in construction. Each Load Range has a corresponding Ply Rating (see chart below).
 - The load capability of the tire will only increase when the air pressure increases.
 - A load range D tire will carry the same maximum load as a load range C tire when they are set at identical air pressures.
 - Light Truck tires will be branded with their load range (**Load Range D or LRD**) or their ply rating (**8 Ply Rated**) on the sidewall.

LT-Metric, LT-Flotation and LT-Numeric Light Truck Tires			
Load Range	Ply Rating	Abbreviated	Max Load Pressure
B	4	B	35 psi (240 kPa)***
C	6	C	50 psi (350 kPa)***
D	8	D	65 psi (450 kPa)***
E	10	E	80 psi (550 kPa)***
F	12	F	95 psi (650 kPa)***

Sidewall Information

- Sidewall information that we have already covered:
 - Tire size, service description, manufacturer name, DOT identification code, and load rating.
- The graphic below outlines additional sidewall information that will be covered in this chapter.



Mud and Snow

- Tires that are designed for use on muddy and/or snow-covered roads are identified by a sidewall marking with the letters 'M' and 'S'.
- The definition of M+S tires is based on the tread design. Tires with tread designs that meet the definition of a 'Mud and Snow' tire will be branded on the sidewall with the 'M' and 'S'.
- The letters will appear in different ways at the discretion of the manufacturer
 - M&S, M+S, M/S, or MS

M+S Sidewall Branding



Typical M+S Tread Design



Severe Snow Designation

- Tires earn the M&S designation based solely on the design and geometry of the tread, and not how well it performs in real world conditions.
- The Rubber Manufacturers Association (RMA) created a separate designation called “Severe Snow Use” that is based on actual tire traction test results.
- A tire with the “Severe Snow Use” designation will have a picture of a mountain and snowflake branded on the sidewall.



Service Type

- Most tire sizes begin with a letter or letters that identify the type of vehicle and/or type of service for which the tires were designed.
- P205/55R16- When a tire size begins with a “P,” it means the tire is a “P-metric” size that was designed to be fitted on vehicles that are primarily used as passenger vehicles
- 205/55R16- If there is not a letter before the size, it signifies the tire is a “Metric” size (commonly referred to as Euro Metric). Metric tires sizes are primarily use on European cars. They are dimensionally the same as P-metric sizes, but typically differ in load carrying capabilities.
 - P-metric and Euro metric tires should never be mixed on the same axel of a car due to the slight difference in load capabilities.
- LT245/75R16- A tire size that begins with “LT” signifies the tire is a “Light Truck-metric” size that was designed to be used on vehicles that are capable of carrying heavy cargo or towing trailers. This includes medium and heavy-duty pickup trucks, SUV’s, and full size vans.
- T125/90D16- A tire size that begins with a “T” means the tire is a “Temporary Spare” that was designed to be used temporarily only until a flat tire can be replaced.
- 195/70R15C- When a Euro-metric tire ends with a “C,” it indicates the tire is a “Commercial” tire intended to be used on vans or delivery trucks that are capable of carrying heavy loads.
- P205/55R16- the “R” in the tire size identifies the tire’s internal construction. The “R” means that the tire has a radial construction. The “R” will be found on 98% of all tires sold.

Service Type- Flotation Sizing

- When a tire size ends with “LT,” it signifies the tire is a ‘flotation’ light truck size.
- Flotation light trucks tires are typically wider, oversized tires designed to help the vehicle drive on top of loose dirt or sandy surfaces.
- Flotation tires are designed for light, medium, and heavy duty pickup trucks and SUV’s.
- A flotation tire size will look different than other passenger and light truck tire sizes.
 - Flotation size example: 33X12.5R15LT
 - 33 is the total diameter of the tire in inches
 - 12.5 is the section width of the tire in inches
 - 15 is the diameter in inches of the rim that the tire is designed to fit.

Flotation Sizing

Section Width
(12.5 in.)

Rim Diameter
(15 in.)

Total Diameter (33 in.)

33X12.5R15

Original Equipment Tire Designations

- Vehicle manufacturers may work with a tire supplier to produce a specified version of a tire that will be outfitted on a new car during production. The tire that is on a new car from the factory is known as the Original Equipment (O.E.) tire.
- The vehicle manufacturer requires the tire suppliers to identify some or all of their O.E. tires with symbols or codes branded on the sidewalls that confirm the tire's original use.
- The vehicle and tire manufacturer's goal is to make it easier for the owners to identify and select exact replacements when the O.E. tires wear out.

Manufacturer	O.E. Sidewall Markings
Aston Martin	AMS, AM8, AM9
Audi	AO, A, RO1
Bentley	B, B1, BC
BMW & Mini Cooper	★
Chrysler	C1
Ferrari	F, K1
Jaguar	J, JRS
Lamborghini	L
Mercedes Benz	MO, MO1, MOE(run-flat)
Porsche	N0, N1, N2...N6
Volkswagen	VO



Performance Categories

- **All-Season Tires**- Designed to help provide traction and grip in a variety of weather conditions including rain, sleet and light snow.
 - All-season tires are a compromise between tires developed for use on dry and wet roads during the summer, and tires developed for use under winter conditions.
- **Winter Tires**- Designed to meet the needs of all winter driving conditions through pliable tread compounds and tread designs that provide snow and ice traction.
 - The rubber compounds of winter tires are designed to remain soft in freezing temperatures.
 - The tread designs feature deep tread blocks with sipes through the blocks that increase traction on snow and ice.
 - Winter tires will have the severe snow designation (mountain/snowflake) on the sidewall.
- **Summer Tires**- Designed to provide responsive handling in both wet and dry conditions through unique tread designs and rubber compounds.
 - Summer tires feature softer rubber compounds that are better able to mold into the pavement's rough texture. The softer rubber typically results in shorter tread life.
 - Summer tires are softer when driven on warm roads, but become very hard in lower temperatures.
 - The tread on a summer tire has more narrow grooves that shed water because these tires are designed to maximize the surface area that contacts the pavement.

Run-Flat Tires

- Run-Flat tires are designed to temporarily carry the weight of the vehicle, even after the tire has lost all air pressure.
- Self-supporting run-flat tires feature a stiffer internal construction and reinforced side walls. You can feel the difference in sidewall stiffness and total weight (typically a 5lb difference) between run-flat and non-run-flat tires.
- Run-flat tires can enable the vehicle to continue to be driven at reduced speed (up to 55mph), and for limited distances of up to 100 miles depending on the type of tire.
-  This symbol designates that a tire is a self-supporting run-flat tire, and may appear on the sidewall of the tire.

Tire manufacturers that produce Run-Flat tires

Manufacturer	Run-Flat Technology
Bridgestone	RFT (Run-Flat Tire)
Dunlop	DSST (Dunlop Self-Supporting Technology)
Goodyear	EMT (Extended Mobility Technology)
Goodyear and Dunlop	ROF (Run-On-Flat)
Kumho	XRP (Extended Runflat Performance)
Michelin	ZP (Zero Pressure)
Pirelli	RFT (Run-Flat Technology)
Yokohama	ZPS (Zero Pressure System)

Tread Patterns-Symmetrical

- Symmetrical tread patterns feature continuous ribs or independent tread blocks across the tire's entire tread face.
- Identical tread patterns on either side of the tire's centerline.
- A symmetrical tread pattern is the most common design.
- Symmetrical tread design allows for multiple tire rotation patterns

Michelin Pilot HX MXM4



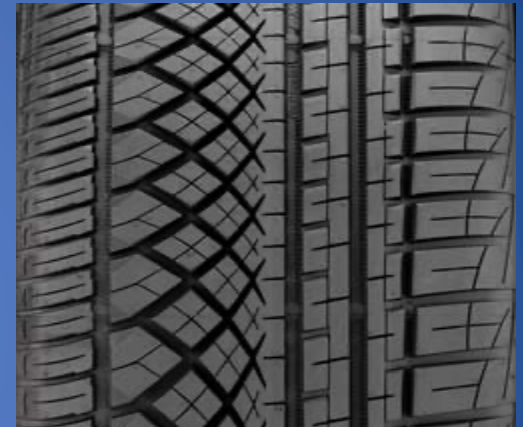
Continental ProContact



Tread Patterns-Asymmetrical

- Asymmetrical tread patterns change across the face of the tread to maximize both wet and dry grip.
- The **outside** of the tire will have larger tread blocks that are designed to maximize cornering performance in dry conditions.
- The **inside and middle** section of the tread will be designed for wet and/or winter traction.
- The tire sidewalls are designated as “OUTSIDE” and “INSIDE” to ensure the correct portion of the tread is mounted in the right position on the vehicle.

Continental Extreme Contact DWS



Tread Patterns-Directional

- A directional tread pattern is designed to roll on only one direction.
- **Lateral grooves** on both sides of the tire's centerline point in the same direction and create the v-shaped tread blocks.
- The grooves improve hydroplaning resistance at high speeds by efficiently moving water through the tread pattern.
- Once installed, directional tires are designed to fit on a specific side of the vehicle.

Bridgestone RE960 AS



The Tire Rack Part Number

- The Tire Rack part number is a unique number that we create for every tire that contains key information about each tire. We use the part number to track and organize all inventory in each warehouse.
 - Every tire we receive from a manufacturer is assigned a Tire Rack part number upon receipt.
- The Tire Rack part number is created by a combination of the tire size, speed rating, model of the tire, and any other characteristics that need to be used to distinguish similar tires from one another.
- Example Size: 205/55R16 Continental Extreme Contact DWS 91W
- Tire Rack Part Number: 055WR6ECDWS
 - The '0' represents the middle number of the section width (205) in the tire size.
 - The '55' represents the sidewall profile of the tire size. This number will be one digit if the sidewall profile ends in a zero, and two digits if it ends in a five.
 - The 'W' is the speed rating-
 - The 'R' refers to the 'R' in the tire size that identifies that the tire has a 'Radial' construction.
 - The '6' comes from the wheel diameter (16) measurement in the tire size. This number is always the second digit of the size of the wheel diameter.
 - **ECDWS** is the abbreviation for the model of the tire, Extreme Contact **DWS**.

The Tire Rack Part Number

Tire Description	Tire Rack Part Number
205/55R16 Continental Extreme Contact DWS 91W	055WR6ECDWS
0 55 W R 6 ECDWS	
225/50R17 Bridgestone Potenza RE97AS 98W Extra Load	25WR7RE97ASXL
2 5 W R 7 RE97AS XL	
275/40R17 Sumitomo HTR Z3 98Y	74YR7HTRZ3
7 4 Y R 7 HTRZ3	
185/55R16 Yokohama Avid Ascend 83H	855HR6ASC
8 55 H R 6 ASC	
265/75R16 Goodyear Wrangler SRA Outlined White Letter 114S.	675SR6WSRAOWL
6 75 S R 6 WSRA OWL	

Understanding the Tire Rack Label

- The Tire Rack label is used in receiving, picking, and all shipping departments.
- The label contains detailed information that is unique to the part number the label is describing.
 - The Tire Rack part number
 - The vendor item number
 - The size and service description of the tire
 - The brand, model, and any physical descriptions that may distinguish one tire from another very similar tire.
 - The country in which the tire was produced
 - Portions of the DOT code that describe different versions of similar tires.
 - Tread wear and traction ratings
- The information that describes each tire on the label can physically be found on the sidewall of the tire.
- In order to understand all of the information on the label, we need to discuss how the information will appear on the label, and what it all means.

Tire Rack Brand Abbreviations

- AV AVON
- BF BFGOODRICH
- BS BRIDGESTONE
- CO CONTINENTAL
- DC DICK CEPEK
- DU DUNLOP
- FS FIRESTONE
- FZ FUZION
- GE GENERAL
- GY GOODYEAR
- HK HANKOOK
- HO HOOSIER
- KE KENDA
- KU KUMHO
- MI MICHELIN
- NE NEXEN
- PI PIRELLI
- PK POWER KING
- SU SUMITOMO
- TO TOYO
- UN UNIROYAL
- YO YOKOHAMA



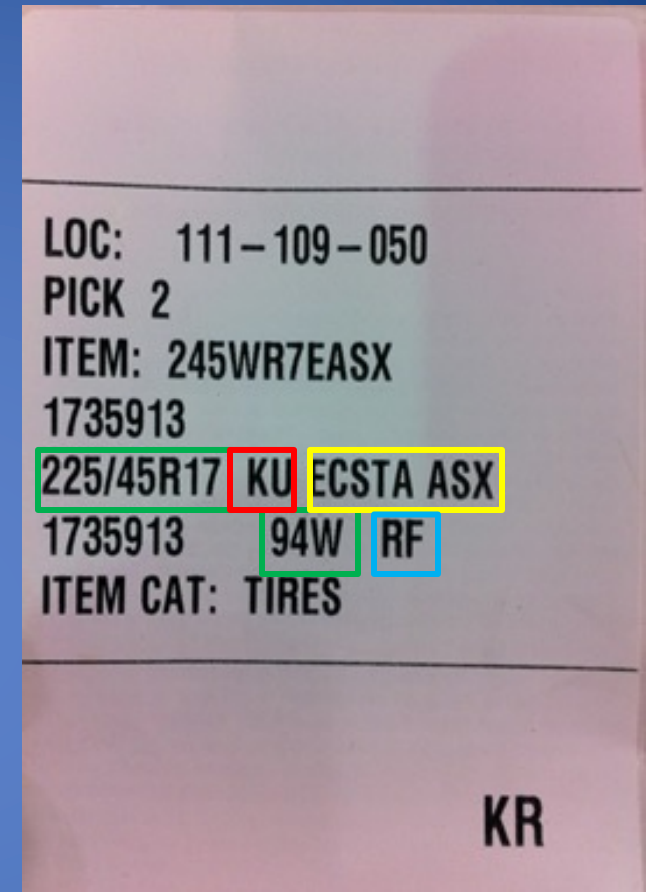
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120981
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120981 96Y ES04FZ
ITEM CAT: TIRES

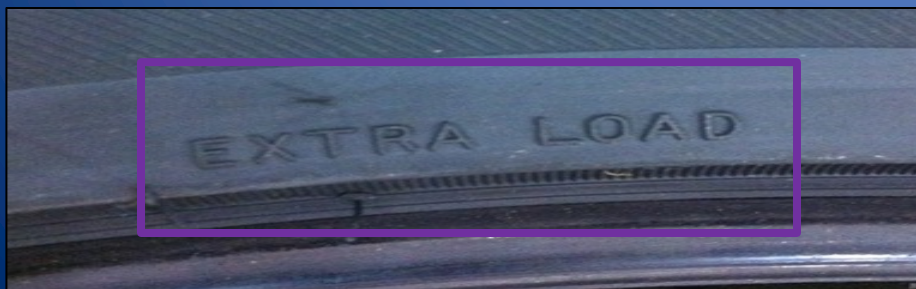


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1735913
225/45R17 **KU** ECSTA ASX
1735913 94W RF
ITEM CAT: TIRES



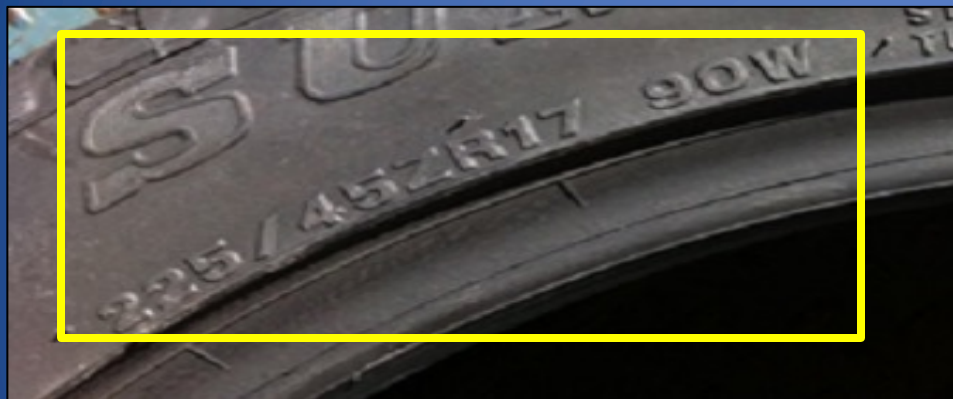
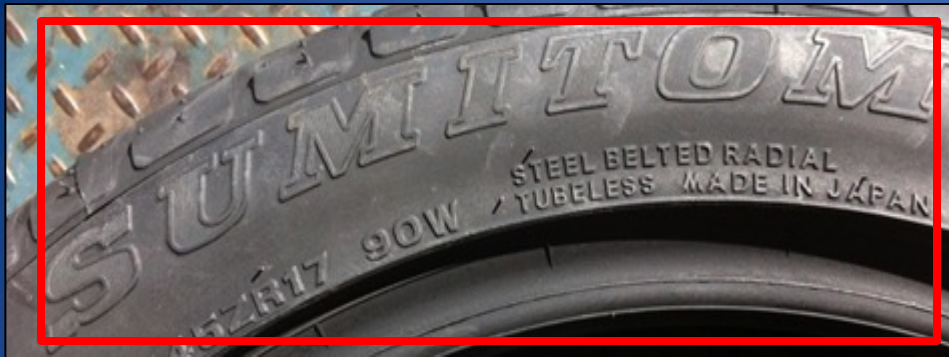
ITEM: 245WR7HTRZ2V2
5518026
225/45R17 **SU** HTR Z 2
5518026 90W 360 A A
ITEM CAT: TIRES





LOC: 109-120-010
PICK 1
ITEM: 535YR9S04PPXL
120981
255/35R19 BS POZ S04 POLE XL
120981 96Y ES04FZ
ITEM CAT: TIRES





LOC: 120-028-030

PICK 1

ITEM: 245WR7HTRZ2V2

5518026

225/45R17 SU HTR Z 2

5518026 90W

360 A A

ITEM CAT: TIRES



Sidewall Descriptions

Sidewall Abbreviation	Sidewall Description
BW or BSW	Black Sidewall
OBL	Outlined Black Letters
RBL	Raised Black Letters
RL	Red Letters
OWL	Outlined White Letters
RWL	Raised Solid White Letters
WW	White Wall
NWS	Narrow White Stripe (1/2 inch)
VSF	Vertical Serrated Band
RP	Rim Protector

Whitewall - WW



LOC: 113-094-030

PICK 1

ITEM: 07TR5KR21

1907213

P205/70R15 KU SOLUS KR21

1907213 95T

ITEM CAT: TIRES

WW

Raised White Letters - RWL



LOC: 110-037-030

PICK 1

ITEM: 67R7ATAKORWLV2

12665

LT265/70R17 BF AT TA KO **RWL** C

12665 C 112/109R

ITEM CAT: TIRES

Outlined White letters - OWL



LOC: 113-050-010

PICK 4

ITEM: 37TR6LTXMS2OWL

07253

P235/70R16 MI LTX MS2 **OWL**

07253 104T

ITEM CAT: TIRES

Narrow White Strip - NWS



LOC: 209-249-040

PICK 4

ITEM: 26TR7LX4W

94860

P225/60R17 MI ENERGY LX4

94860 **NWS** 98T

ITEM CAT: TIRES

Vertical Serrated Band- VSB



LOC: 208-309-030

PICK 1

ITEM: 465SR7FORTH LV2

151284203

P245/65R17 GY FORT HL **VSB**

151-284-203 8TCC 105S

ITEM CAT: TIRES

US

Rim Protector- RP

