Technical Notes — March '10' - Tire Designations

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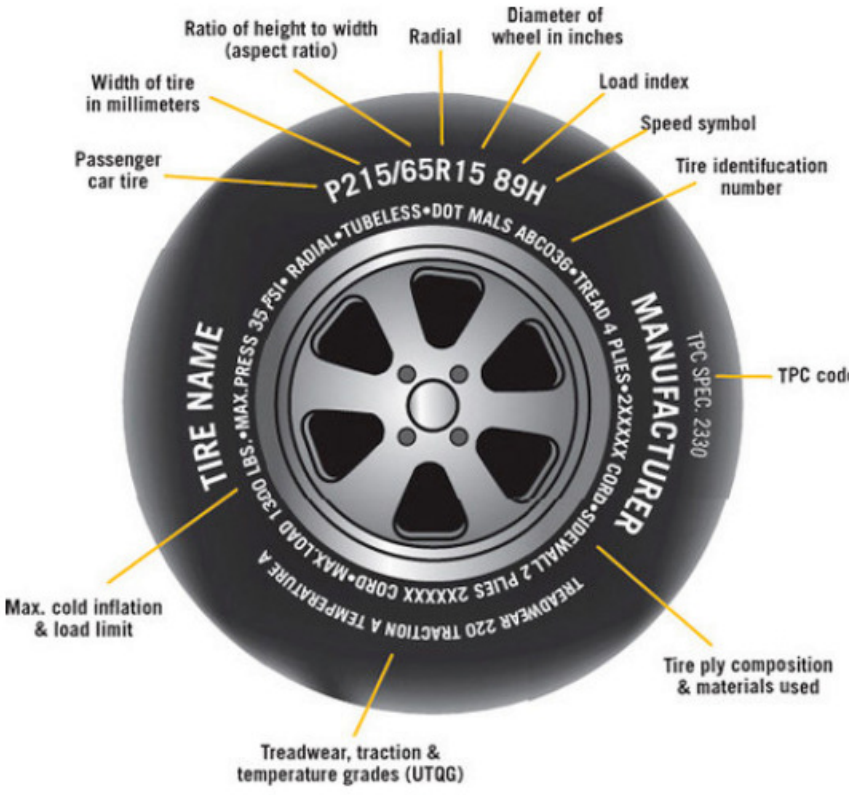
Technical Committee —Chair

Tire designations. Did you ever wonder what all that scribbling on the side of your tires meant? You got a great price on your new tires, but do you know if the tire store is screwing you or not? In this article I will look at the meanings of the markings on the tire sidewall. We will look at some issues associated with these markings, but the article is not meant to be an all-encompassing review of how to buy tires or this discussion would take several months to cover. Most of us drive more than our Corvettes, so you can carry some points of this discussion over to your family car if you wish.

The markings on modern day tires are regulated by International governments and are fairly standardized. Below is a typical tire with the markings identified. The markings are pretty self-explanatory, but let's examine a few in closer detail. First, let me substitute some of the numbers shown on this example with actual markings off a typical C6 Corvette tire. The example on the left shows these markings:



Manufacturer: MANUFACTURER

Tire Name: TIRE NAME

Size: P215/65R15 89H

Load Limit: 1300 lbs

UTQG: 220 A A

Max Tire Pressure: 35 psi

For the front tire on a C6 Corvette Coupe, you would see these markings on your original equipment manufacturer (OEM) tires:

Manufacturer: GOODYEAR

Tire Name: EAGLE F1 G2 EMT

Size: P245/40ZR18 (88Y) LL

Load Limit: 1235 lbs

UTQG: 300 AA A

Max Tire Pressure: 44 psi

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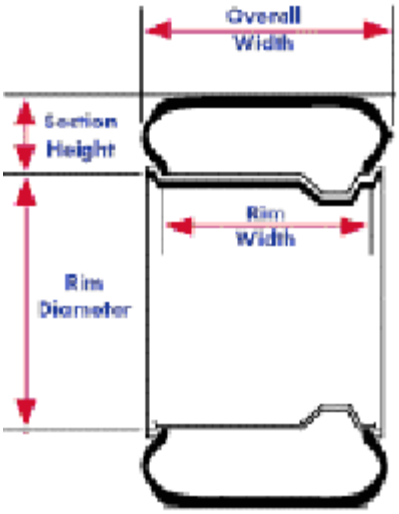
There are additional special markings on your C5 or C6 tire. Since virtually all modern Corvette tires are run-flat technology, called "Extended Mobility Tire" (EMT) by Goodyear, you will a virtual liturgy of warnings and restrictions on the sidewall. Such things as the maximum speed and distance you may travel with the tires under inflated or with zero pressure; warnings about avoiding severe cornering; and warnings that the vehicle must be equipped with a tire pressure monitoring system. You know, lawyer talk. Also, you will see a giant arrow with the word "rotation" at the tail of the arrow. Corvette tires are unidirectional so that tire manufacturers can design a tread pattern to maximize performance. Unidirectional tires unfortunately also mean that you cannot interchange tires side to side as may be possible with your family sedan.

So what do all the markings mean? Let's look at the size first using the Corvette tire for our example. Well, the "P" is for p-metric and denotes a passenger car tire. "LT" would indicate a light truck, which is something you may see on your SUV. "245/45" means that the overall width of the tire at its fattest point is 245 mm (1 inch equals roughly 25 mm). So, the tire is about 10 inches wide, but that is not a 10 inch tread width. "45" means the aspect ratio is 45. This means that the section height of one side of the tire from the ground to the rim is 45% of 10 inch width or about 4 ½ inches. The letters "ZR" mean a radial. Most of your family passenger car tires would simply have a R indicating a radial tire. In the case of our Corvettes the letter "Z" is added to indicate that the tire is capable of speeds above 149 mph, however, you must look further at the markings, as we will see, to get the real maximum speed capability of the tire. The letter "R" for radial is almost universal nowadays, because all manufacturers use the superior radial design in their tires. For us C1 and C2 folks, however, an "R" will not appear.



Older tires started out as bias ply and then moved onto belted bias ply in the C3 era. Finally you see the number "18" which indicates the wheel diameter or rim diameter shown in the diagram. Modern C5 and C6 Corvettes have different sized front and rear tires, so you cannot "rotate the tires" (switch the fronts with the rears) as you do in your passenger car tires when you go in for service. Therefore, because the front and rear wheel rims are different sizes and all tires are unidirectional, modern Corvettes can use only one particular tire on any one wheel.

Now, the next two designations are the heart of the high performance tires used on Corvettes. ZR tires were the cat's meow when 150 mph was considered fast and manufacturers put that letter in front of the R to denote those high speed tires. But, in the world of high performance cars fast never seems to be fast enough. As automobile manufacturers came up with high top speeds, tire manufacturers had to come up with more designations. Here's the current tire speed table:

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Designator	Max Speed (mph)	Max Speed (km/h)	General Use
L	75 mph	120 km/h	Off-Road & Light Truck Tires
M	81 mph	130 km/h	
N	87 mph	140km/h	Temporary Spare Tires
P	93 mph	150 km/h	
Q	99 mph	160 km/h	Studless & Studdable Winter Tires
R	106 mph	170 km/h	H.D. Light Truck Tires
S	112 mph	180 km/h	Family Sedans & Vans
T	118 mph	190 km/h	Family Sedans & Vans
U	124 mph	200 km/h	
H	130 mph	210 km/h	Sport Sedans & Coupes
V	149 mph	240 km/h	Sport Sedans, Coupes & Sports Cars
W	168 mph	270 km/h	Exotic Sports Cars
Y	186 mph	300 km/h	Exotic Sports Cars

Unfortunately, Corvettes and other exotics nowadays can now exceed 186 mph, so the manufacturers had to come up with a different coding. Since Z had already been used when 150 was the high end for production vehicles, manufacturers devised another notation. If you'll notice the Corvette tire has a (88Y) notation. From the chart below you will see that that notation denotes both load and speed. If you went strictly by these two charts, you would surmise that our C6 Corvette had a load limit of 1235 pounds per tire and a speed rating of Y, or 186 mph.

LOAD INDEX AND EQUIVALENT LOADS

Load Index	Load (lbs.)*	Load Index	Load (lbs.)*	Load Index	Load (lbs.)*
74	827	100	1764	126	3748
75	853	101	1819	127	3858
76	882	102	1874	128	3968
77	906	103	1929	129	4079
78	937	104	1984	130	4189
79	963	105	2039	131	4299
80	992	106	2094	132	4409
81	1019	107	2149	133	4541
82	1047	108	2205	134	4674
83	1074	109	2271	135	4806
84	1102	110	2337	136	4938
85	1135	111	2403	137	5071
86	1168	112	2469	138	5203
87	1201	113	2535	139	5357
88	1235	114	2601	140	5512
89	1279	115	2679	141	5677
90	1323	116	2756	142	5842
91	1356	117	2833	143	6008
92	1389	118	2910	144	6173
93	1433	119	2998	145	6393
94	1477	120	3086	146	6614
95	1521	121	3197	147	6779
96	1565	122	3307	148	6944
97	1609	123	3417	149	7165
98	1653	124	3527	150	7385
99	1709	125	3638		

* One pound is equal to .4536 kg.

Speed Symbols

Speed Symbol	Speed (km/h)	Speed (mph)
A1	5	3
A2	10	6
A3	15	9
A4	20	12
A5	25	16
A6	30	19
A7	35	22
A8	40	25
B	50	31
C	60	37
D	65	40
E	70	43
F	80	50
G	90	56
J	100	62
K	110	68
L	120	75
M	130	81
N	140	87
P	150	94
Q	160	100
R	170	106
S	180	112
T	190	118
U	200	124
H	210	130
V	240	149
W	270	168
Y	300	186
ZR	Above 300 ↓	Above 186 ↓

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However, the rating is not 88Y, it is (88Y), and the parentheses makes a huge difference in the rating. Regardless of the number and letter, if the rating is shown in parenthesis, it designates that the tire has been tested and is capable of speeds **IN EXCESS** of 186 mph. How far in excess is not specified, though.

The weight bearing of 1235 lbs per tire indicates our Corvette Is capable of weighing four times that amount, or 4,940 pounds. Even using the C6 convertible, which has the highest curb weight of any C6 (3199 pounds), you would have a tough time exceeding the vehicle maximum gross weight. No matter how often the club goes out to eat on FCCC events, you will never get fat enough to pop the tires of your expensive sports car.

Now, there is another designation behind the size "LL." "LL" indicates light load. This designation is also primarily for high performance vehicles as tire manufacturers are only permitted to make "LL" tires for tires with aspect ratios of 45 or below. Your SUV may have no designation or even an "XL", for extra load. However. SUVs, sedans, etc. will never use "LL."

Now, let's address the UTQG or Uniform Tire Quality Grade. Manufacturers are not require to provide this rating for special tires like snow tires or off road tires with deep treads, but for regular tires, this rating will let you know how well your tires will perform. Unfortunately, although standards are set, the testing is not always indicative of what you may see in real world conditions. The first rating stands for tire wear. It uses a three-digit number that is incremented by 20. The higher the number the longer the tire will last. So, a tire that shows 320 should last twice as long as one with a rating of 160. A 160 rating indicates a soft compound rubber and you would see it used on high performance vehicle tires with suspensions meant to corner well, such as the Z06. However, wear testing is done on a government test course. If you do a lot of cornering in the course of every day driving, you may wear the edges of a tire with a 160 rating more quickly than the comparison numbers would suggest. That may be the case because the test course may have a higher percentage of straightaway (highway) driving than you regularly encounter.

The next two numbers are traction and temperature ratings. Traction goes from "C" to "AA" with "AA" being the best. Temperature ratings are from "C" to "A" where "A" is the top rating. Unfortunately, the traction rating does not indicate that your Corvette can corner better than the Mustang next to you because he has an "A" rating on his tires, or that you can beat him off the line at a traffic light. The traction test is only done on wet pavement and indicates the ability of the tire to stop the vehicle. The Temperature figure is the ability of the tire to dissipate heat. Obviously, for a sports car like the Corvette, you would expect to see "AA A" for any UTQG. It wouldn't make sense for a car meant to start and stop fast and capable of reaching such high speeds to be susceptible to poor braking and heat failure. However, you'll often see "A B" on conventional passenger car tires.

Maximum inflation pressure for our example Corvette tire is 44 psi. However, the real expression is maximum ***cold*** inflation pressure. After you've driven your car a bit, the tires will warm up to operating temperature. On a hot summer day at high speed on the Interstate, they may even get a bit warmer than usual. Your tire pressure can climb to 3-4 psi higher than they were when you inflated them. So, never add air to meet specification to a warm tire.

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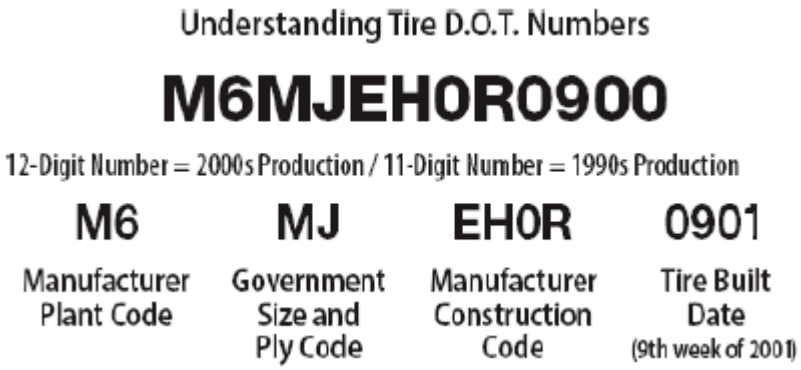
Also, avoid using pressures well above the manufacturer's recommended setting. You may remember that a previous article on nitrogen discussed improving gas mileage a bit by keeping the pressure at or slight above the recommended cold inflation pressure. However, you cannot carry that concept too far. Fortunately, for us Corvette owners, the tire pressure monitoring system will alert you when the pressure exceeds 40 psi. I know, you thought the reason for having such a system was to only alert you to low tire pressures.

We should also discuss the tire manufacture date. This has become a topic addressed by the news media recently. Tires have DOT code which includes a manufacturing date. It would look something like this:



You may also see a three-digit number at the end, such as 228. Three-digit numbers indicate tires that were manufactured in the 1990s and are read as two-digit week and a one-digit number indicating the last number in the year. 228 would indicate the 22nd week of the year 1998.

Ford in now recommending removing tires from your vehicle if they are older than six years. Tire manufacturers are adamantly against this recommendation and say that the tire is good if it has more than 1/16th inch of tread and shows no signs of failure such as cuts, cracks or bulges in the sidewall. Needless to say, if you drive your brand new Corvette only on sunny days, you might only put on ten to fifteen thousands miles in six years. Thus, you would be out about $1500 just to replace tires that may only be half worn. Clearly, this is not an issue for family vehicles, as you most likely will replace tires every few years.

Winter tires – yup, that's what I said – winter tires. If you look on-line, most Corvette tires are listed as summer tires. That means they will not do well in winter conditions, although you are not forbidden from using them as you please. Goodyear does have warnings about spinning your tires in wintry conditions, however I made personal phone calls to Chevrolet and Goodyear the representatives clearly stated that they sell all Corvettes with OEM factory tires without climate restrictions. Unfortunately, in some European countries it is illegal to drive in winter with summer tires. Also, a truly conscientious Corvette owner in our northern states would naturally buy the Goodyear winter EMT tire (yes, they make them) and change them out every fall. By the way, Goodyear warns to change all four tires out, not just the rears. I wonder what that would do to our "conscientious owner's" pocket book in tire change costs every six months and possibility replacing a rim from shop damage? But, Corvette owners are rich, right?

My point here is that Goodyear, Michelin and others now make M&S tires. It would show up as M&S or M and S indicating a better performance in mud and snow type conditions. These tires are also known as "all season" tires. Normally, you see this improved traction designation tires on your sedan or SUV, not stamped on your OEM factory Corvette tire.

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But, you can now buy M&S tires EMTY for your Corvette if you are concerned about better traction and are willing to give up a smidgen of performance.

Finally, I'd like to address oversizing or substitute sizing. Let's use an example of a Jeep Grand Cherokee, which has a standard size tire of 235/65R17. Most tire dealers will quote you that OEM size or an alternate size of 245/65R17. What does that mean? Well, industry standards usually permit a 3% oversize on most vehicles. Many trucks and SUVs have suspensions that can accept as much as a 15% oversize. Undersizing is not recommended. In the Jeep case above, using the alternative size would increase the tire diameter about ½ inch, or roughly 2%. Oversizing has two potentially adverse effects. 1. During sharp turns with the wheel bouncing, you could bind the steering. 2. Oversizing leads to errors in speedometers. In most case, these effects are not an issue. In fact, tire sellers are well aware of the first issue and do not recommended substitute tire sizes unless approved by the manufacturer. But, oversizing a truck or SUV 15% will cause a nine mph error in the speedometer at 60 mph. It's always in the "wrong" direction, of course, meaning that it will result in a ticket if you are not aware of oversizing effects.

For Corvettes and most high performance sports cars, oversizing or substitute sizing is strongly discouraged by the manufacturer. Unlike SUVs, the wheel well clearances are tight and the suspensions are built for tires with a certain weight. Oversizing can cause some pretty serious safety hazards on such vehicles, but as a minimum, reduced cornering performance. Now, time for the bonus question: The picture of the tire in the beginning of this article has a glaring error. Use the information I presented in this article and tell me at Woody's what lettering is not correct on that picture.