the prancing horse

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Those who drive high-performance vehicles depend completely on their tires—usually without even thinking about them. Tires are expected to provide excellent dry traction when cornering or accelerating, good grip in the wet and reasonably long mileage. Tire technology is far advanced from the days when the choices were Michelin Xs, Pirelli radials or Dunlops. Today varying performance requirements create conflicting design parameters, e.g., high lateral grip versus long wear, which present unique challenges to tire designers.

We're bombarded by advertising and performance claims from over 20 brands of high-performance tires, with claims ranging from superior dry cornering, excellent wet traction, long mileage or quiet running. Highly specialized tires offer even more claims. This article provides information about high-performance tires, which are purchased at major expense and mounted on very expensive alloy wheels.

First, an explanation of the tire size and performance data molded on the side of the tire, using a 285/35ZR18 tire as an example. "285" is the tread width in millimeters, equal to 11.22 inches. "35" is the aspect ratio—the tire height divided by tire width. The example tire is 0.35 times as high as it is wide. "Z" is the tire speed rating (see Table 1). The example tire sustained 149+ mph testing. "R" designates radial construction. "18" is the correct wheel rim diameter for this tire. Naturally, there are other descriptions and terms to understand. Here are some that are useful to understand when considering what high-performance tire to buy: *overall tire diameter*—mounted and inflated to recommended pressure; tire section height—bead to tread face; *tire aspect ratio*—section height/section width and *tread width*—inner to outer tread shoulder. Tires classes are "P-Metric" for passenger cars, "LT" for light trucks and SUVs and "ST" for special trailer tires.

The tire industry defines three levels of automobile tire performance: (1) High Performance (HP) tires are the first level performance tires above those for normal passenger cars. They have a lower profile, improved dry and wet traction and slightly reduced mileage; (2) Ultra-High Performance (UHP) tires have lower profiles and more advanced tread rubber compounding and tire construction than HP tires. Asymmetric tread patterns offer better dry handling/traction with slightly less wet traction and shorter tread life and (3) Maximum Performance (EP) tires provide maximum performance, ultra low profile, state-of-the-current-art tread design and tread rubber compounding, improved dry traction and higher speed ratings. Most EP tires are Y-rated for speeds up to and over 186-mph. They are street legal and DOT-approved. They approach race tire dry handling performance with less tread pattern voids (area) and stiffer sidewall construction.

Table 1

RATING	MAX. SPEED
M	81
N	87
P	93
Q	99
R	106
S	112
T	118
U	124
H	124
V	149
Z	149+
W	168
(Y)	186+

Current industry and DOT speed ratings and tire rated speeds result from testing tires running against a rotating large steel drum in 6.2-mph steps, ten minutes at each step, up to the rated speed. A tire designated 285/35ZR19 W has a maximum speed rating of 168-mph. A similar tire, identified 285/35ZR19 99Y, has a maximum speed rating of 186-mph. If a Y follows the tire nomenclature, it's been tested above 186-mph. Table 1 shows the tire rating letter designations and their *maximum* speed ratings in mph.

Modern performance tire construction typically uses polyester tread plies laid in a radial pattern with angled steel cord belts, plus a circumferential nylon cord cap to control tire "growth" at high speed. The sidewall uses radial plies of polyester cord. Tread rubber will be "dual layer," with softer rubber underneath a harder layer to provide improved wet traction when the tire is worn.

An advanced performance tire may have a tread pattern with "siping," fine cross-tire cuts with leading edge tread elements in an arc form, to provide improved dry performance. Performance tread rubber compounds substitute silica for some carbon black to improve wet grip and to reduce tire rolling resistance, improving fuel economy.

If you decide to fit a larger diameter wheel with a lower profile tire, a "plus" size, a maximum of 1.5-inch car chassis drop is recommended. The larger wheel and lower profile tire should have the same number of rotations per mile as the original wheel and tire for correct speedometer readings. Lower springs with different spring rates may be fitted, requiring wheel realignment and typically a stiffer ride.

next page