



FACT SHEET

Module 4.1

Tires and Traction Control

TIRES

Tires are the vehicle's lifelines to the roadway.

Tires have two functions:

- They are air-filled cushions that absorb most of the shocks caused by road hazards.
- The tires flex, or give, as they meet these irregularities.
- This reduces the effect of the shocks on the vehicle and the passengers.

Secondly,

- The tires grip the road to provide traction.
- This enables the driver to accelerate, brake, and steer the vehicle.
- This reduces the effect of the shocks on the vehicle and the passengers.

Some Basic Definitions

Ply—layers of material (cords impregnated with rubber) under the tread. Each ply strengthens the tire and gives it shape.

There are two basic tire types:

- 1) Bias ply—plies are criss-crossed. This makes the casing strong in all directions. However, these tires wear more rapidly and provide less traction.
Radial ply—plies are parallel and perpendicular to the tread.

- 2) Belts (usually steel) are attached in the same position as the tread, which is then applied to the sidewall and results in more flexibility.

Traction—The actual gripping power between the tires and the roadway surface.

Traction provides:

- Improved tread mileage.
- Improved fuel economy.

Information about the tire's construction, size, recommended inflation levels, and carrying capacity is clearly marked on the sidewall of the tire.

New tires usually have a paper label attached with additional information.

Maintain the manufacturer's recommended air pressure in the tires at all times.

Keep a reliable tire gauge in the vehicle and use it regularly. Maintaining proper air pressure in the tire will yield maximum fuel efficiency and tire mileage. Too little air pressure can make handling the vehicle more difficult. Tires will not get as much mileage either.

Caution: The risk of a blowout with underinflated tires is greater.

Always check the tires for wear whenever the vehicle is serviced. If abnormal wear is noticed, have a service technician correct the problem.

TIRE QUALITY AND GRADING

All tires sold in the United States are rated on the Uniform Tire Quality Grading System. This can be read on the sidewall of the tire.

Tires are rated by:

- Traction - measured by the ability to stop a car in straight-ahead motion on a wet surface. A tire graded A has the best traction performance, B grading is an above average rating, and C grading indicates the tire meets government standards.
- Temperature - indicates the tire's ability to withstand heat. A tire graded A is the most heat resistant and less likely to suffer a blowout under the same conditions as tires with grades of B or C.
- Tread wear-The higher the tread wear rating, the greater the mileage. A tire with a tread wear rating of 150 is expected to last 50 percent longer than one graded at 100.

Keep safety in mind when new tires are needed. Compare and decide which type of tire offers the best value for the kind of driving done. Check the owner's manual for recommendations on tires for the vehicle.

TRACTION

Traction is the actual gripping power between the tires and the roadway surface:

- The more traction there is, the greater the gripping power.
- Friction is the force that keeps each tire from sliding on the road.
- The friction created by the tire on the road is traction.
- Traction makes it possible for the vehicle to grip the road so the driver can change speed and direction.

Two things are necessary to maintain ideal levels of traction:

- Vehicle must be in good condition;
- Road must be smooth, paved, level, and clean.

Vehicle condition

As a vehicle ages, it must be maintained in order to perform correctly.

- If tires, shock absorbers, or steering system parts are allowed to wear, traction and control will be reduced.
- Good shock absorbers are very important for maintaining traction.
- Worn shock absorbers will limit vehicle control; have them replaced as soon as possible.
- Worn or improperly inflated tires also will limit control. Check tire pressure and tread frequently, and replace tires as needed.

Tire Pressure and Loading

Checking Tire Pressure

It is important to check your vehicle's tire pressure at **least once a month** for the following reasons:

- Most tires may naturally lose air over time.
- Tires can lose air suddenly if you drive over a pothole or other object or if you strike the curb when parking.

With radial tires, it is usually **not possible to determine under inflation by visual inspection.**

Steps for Maintaining Proper Tire Pressure

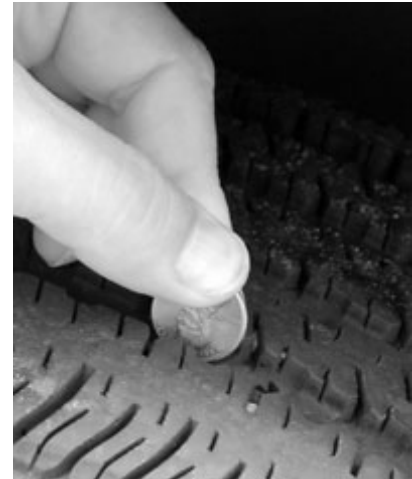
- **Step 1:** Locate the recommended tire pressure on the vehicle's tire information placard, certification label, or in the owner's manual.
- **Step 2:** Record the tire pressure of all tires.
- **Step 3:** If the tire pressure is too high in any of the tires, slowly release air by gently pressing on the tire valve stem with the edge of your tire gauge until you get to the correct pressure.
- **Step 4:** If the tire pressure is too low, note the difference between the measured tire pressure and the correct tire pressure. These "missing" pounds of pressure are what you will need to add.
- **Step 5:** At a service station, add the missing pounds of air pressure to each tire that is under inflated.

- **Step 6:** Check all the tires to make sure they have the same air pressure (except in cases in which the front and rear tires are supposed to have different amounts of pressure).

If you have been driving your vehicle and think that a tire is under inflated, fill it to the recommended cold inflation pressure indicated on your vehicle's tire information placard or certification label. While your tire may still be slightly under inflated due to the extra pounds of pressure in the warm tire, it is safer to drive with air pressure that is slightly lower than the vehicle manufacturer's recommended cold inflation pressure than to drive with a significantly under inflated tire. Since this is a temporary fix, don't forget to recheck and adjust the tire's pressure when you can obtain a cold reading.

Tire Tread

The tire tread provides the gripping action and traction that prevent your vehicle from slipping or sliding, especially when the road is wet or icy. In general, tires are not safe and should be replaced when the tread is worn down to 1/16 of an inch. Tires have built-in treadwear indicators that let you know when it is time to replace your tires. These indicators are raised sections spaced intermittently in the bottom of the tread grooves. When they appear "even" with the outside of the tread, it is time to replace your tires.



Another method for checking tread depth is to place a penny in the tread with Lincoln's head upside down and facing you. If you can see the top of Lincoln's head, you are ready for new tires.

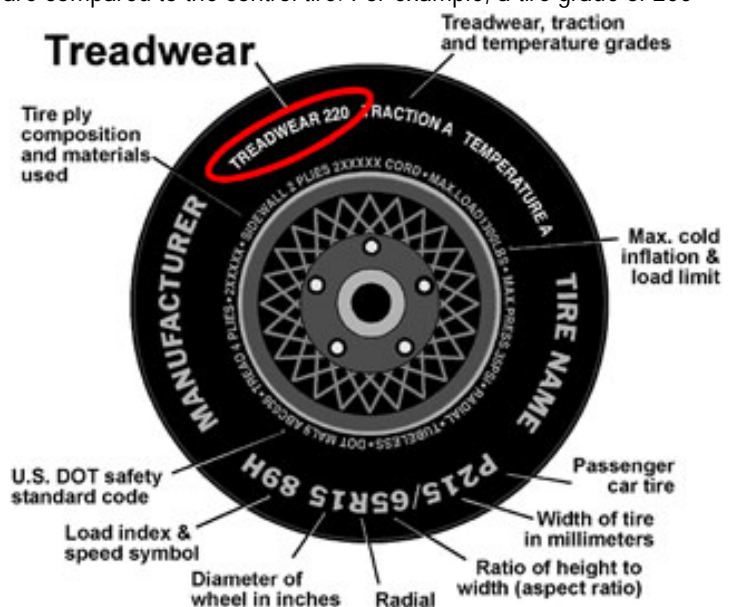
Tire Ratings - Treadwear

Treadwear grades are an indication of a tire's relative wear rate. The higher the treadwear number is, the longer it should take for the tread to wear down.

A control tire is assigned a grade of 100. Other tires are compared to the control tire. For example, a tire grade of 200 should wear twice as long as the control tire.

Of current tires:

- 15% are rated below 200
- 25% are rated 201 - 300
- 32% are rated 301 - 400
- 20% are rated 401 - 500
- 6% are rated 501 - 600
- 2% are rated above 600



Tire Ratings - Traction

Traction grades are an indication of a tire's ability to stop on wet pavement. A higher graded tire should allow a car to stop on wet roads in a shorter distance than a tire with a lower grade. Traction is graded from highest to lowest as "AA", "A", "B", and "C".

Of current tires:

- 3% are rated "AA"
- 75% are rated "A"
- 22% are rated "B"
- only 1 line of tires rated "C"

Tire Ratings - Temperature

Temperature grades are an indication of a tire's resistance to heat. Sustained high temperature (for example, driving long distances in hot weather), can cause a tire to deteriorate, leading to blowouts and tread separation. From highest to lowest, a tire's resistance to heat is graded as "A", "B", or "C".

Of current tires:

- 27% are rated "A"
- 59% are rated "B"
- 11% are rated "C"

Tire Labeling

Federal law requires tire manufacturers to place standardized information on the sidewall of all tires. This information identifies and describes the fundamental characteristics of the tire and also provides a tire identification number for safety standard certification and in case of a recall.

Tire Labeling - Passenger Vehicles

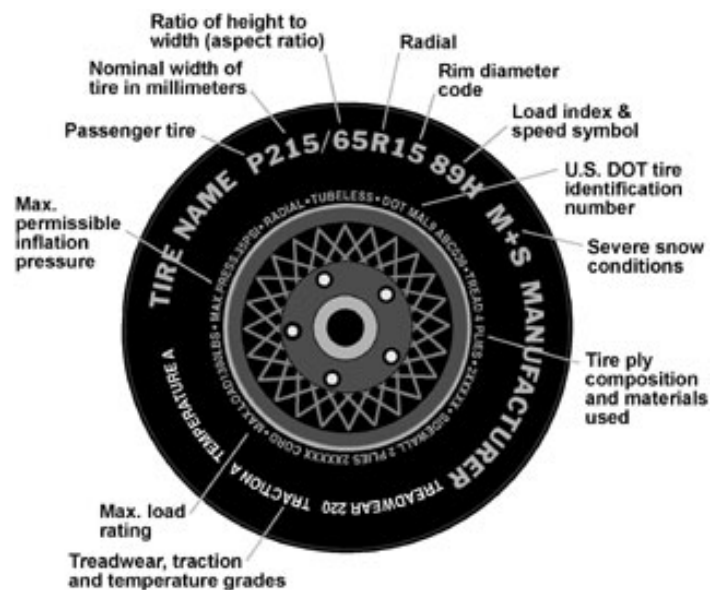
PASSENGER VEHICLE SIDEWALL OUTER CIRCLE

P The "P" indicates the tire is for passenger vehicles.

Nominal Width This three-digit number gives the width in millimeters of the tire from sidewall edge to sidewall edge. In general, the larger the number, the wider the tire.

Aspect Ratio This two-digit number, known as the aspect ratio, gives the tire's ratio of height to width. Numbers of 70 or lower indicate a short sidewall for improved steering response and better overall handling on dry pavement.

R The "R" stands for radial. Radial ply construction of tires has been the industry standard for the past 20 years.



Rim diameter code This two-digit number is the wheel or rim diameter in inches. If you change your wheel size, you will have to purchase new tires to match the new wheel diameter.

Load index This two- or three-digit number is the tire's load index. It is a measurement of how much weight each tire can support. You may find this information in your owner's manual. If not, contact a local tire dealer. Note: You may not find this information on all tires because it is not required by law.

Severe snow conditions The "M+S" or "M/S" indicates that the tire has some mud and snow capability. Most radial tires have these markings; hence, they have some mud and snow capability.



FACT SHEET

Module 4.1

Tire Safety

Source: <http://www.nhtsa.dot.gov/cars/problems/Equipment/Tires/index.html>

Everything Rides On It

Studies of tire safety show that maintaining proper tire pressure, observing tire and vehicle load limits (not carrying more weight in your vehicle than your tires or vehicle can safely handle), avoiding road hazards, and inspecting tires for cuts, slashes, and other irregularities are the most important things you can do to avoid tire failure, such as tread separation or blowout and flat tires. These actions, along with other care and maintenance activities, can also:

- Improve vehicle handling
- Help protect you and others from avoidable breakdowns and accidents
- Improve fuel economy
- Increase the life of your tires.

Use this information to make tire safety a regular part of the vehicle maintenance routine. Recognize that the time spent is minimal compared with the inconvenience and safety consequences of a flat tire or other tire failure.

Safety First—Basic Tire Maintenance

Properly maintained tires improve the:

- steering,
- stopping,
- traction, and
- load-carrying capability of your vehicle.

Under-inflated tires and overloaded vehicles are a major cause of tire failure. To avoid flat tires and other types of tire failure, maintain proper tire pressure, observe tire and vehicle load limits, avoid road hazards, and regularly inspect tires.

Finding Your Vehicle's Recommended Tire Pressure and Load Limits

Tire information placards and vehicle certification labels contain information on tires and load limits. These labels indicate the vehicle manufacturer's information including:

- Recommended tire size
- Recommended tire inflation pressure
- Vehicle capacity weight (VCW—the maximum occupant and cargo weight a vehicle is designed to carry)
- Front and rear gross axle weight ratings (GAWR—the maximum weight the axle systems are designed to carry).

Both placards and certification labels are permanently attached to the vehicle door edge, door post, glove-box door, or inside of the trunk lid. The recommended tire pressure and load limit for a vehicle can also be found in the vehicle owner's manual.

Understanding Tire Pressure and Load Limits

Tire inflation pressure is the level of air in the tire that provides it with load-carrying capacity and affects the overall performance of the vehicle. The tire inflation pressure is a number that indicates the amount of air pressure—measured in pounds per square inch (psi)—a tire requires to be properly inflated. (This number is also on the vehicle information placard expressed in kilopascals (kPa), which is the metric measure used internationally.)

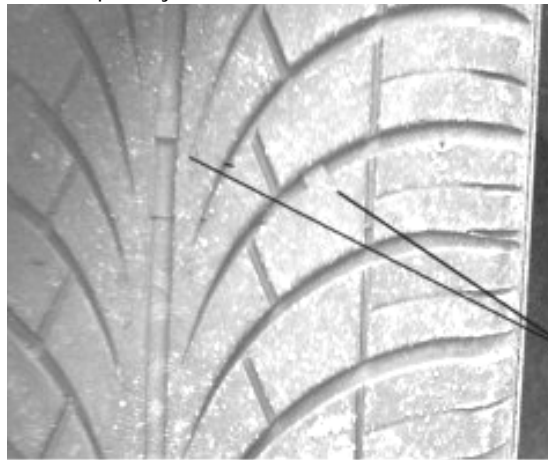
inflated tire. Since this is a temporary fix, don't forget to recheck and adjust the tire's pressure when a cold reading can be obtained.

Tire Size

To maintain tire safety, purchase new tires that are the same size as the vehicle's original tires or another size recommended by the manufacturer. Look at the tire information placard, the owner's manual, or the sidewall of the tire being replaced to find this information. If there is any doubt about the correct size to choose, consult with the tire dealer.

Tire Tread

The tire tread provides the gripping action and traction that prevent the vehicle from slipping or sliding, especially when the road is wet or icy. In general, tires are not safe and should be replaced when the tread is worn down to 1/16 of an inch. Tires have built-in treadwear indicators that let you know when it is time to replace your tires. These indicators are raised sections spaced intermittently in the bottom of the tread grooves. When they appear "even" with the outside of the tread, it is time to replace your tires.



Treadwear Indicators

Another method for checking tread depth is to place a penny in the tread with Lincoln's head upside down and facing you. If you can see the top of Lincoln's head, you are ready for new tires.

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Tire Balance and Wheel Alignment

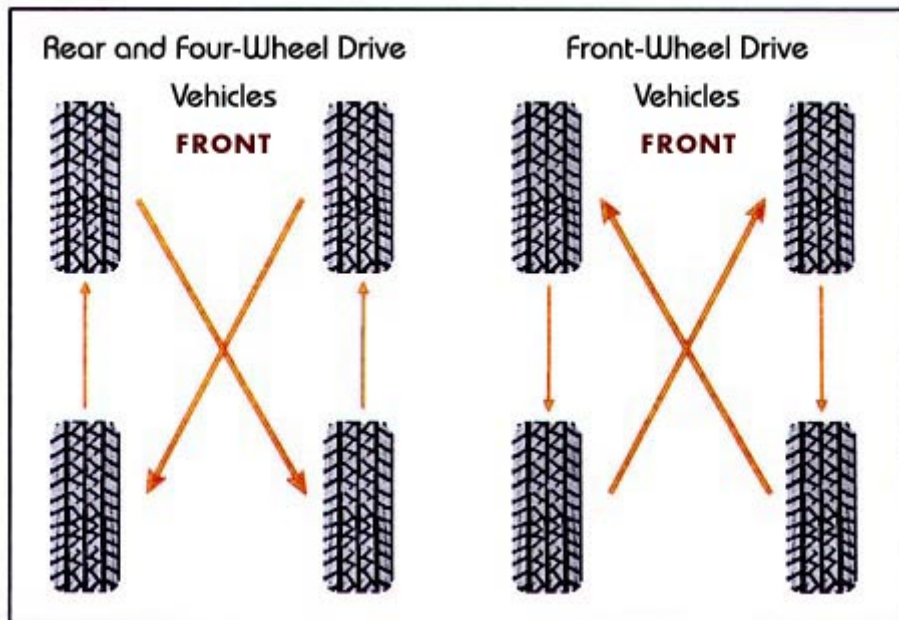
To avoid vibration or shaking of the vehicle when a tire rotates, the tire must be properly balanced. This balance is achieved by positioning weights on the wheel to counterbalance heavy spots on the wheel-and-tire assembly. A wheel alignment adjusts the angles of the wheels so that they are positioned correctly relative to the vehicle's frame. This adjustment maximizes the life of tires and prevents the vehicle from veering to the right or left when driving on a straight, level road. These adjustments require special equipment and should be performed by a qualified technician.

Tire Rotation

Rotating tires from front to back and from side to side can reduce irregular wear (for vehicles that have tires that are all the same size). Look in the owner's manual for information on how frequently the tires on a vehicle should be rotated and the best pattern for rotation.

A Tire Rotation Example

For maximum mileage, rotate your tires every 5,000 miles. Follow correct rotation patterns.



Tire Repair

The proper repair of a punctured tire requires a plug for the hole and a patch for the area inside the tire that surrounds the puncture hole. Punctures through the tread can be repaired if they are not too large, but punctures to the sidewall should not be repaired. Tires must be removed from the rim to be properly inspected before being plugged and patched.

Uniform Tire Quality Grading System (UTQGS)

To help consumers compare a passenger car tire's treadwear rate, traction performance, and temperature resistance, the federal government requires tire manufacturers to grade tires in these three areas. This grading system, known as the Uniform Tire Quality Grading System, provides guidelines for making relative comparisons when purchasing new tires. This information can be used to inquire about the quality of tires placed on new vehicles.

Although this rating system is very helpful when buying new tires, it is not a safety rating or guarantee of how well a tire will perform or how long it will last. Other factors such as personal driving style, type of car, quality of the roads, and tire maintenance habits have a significant influence on your tire's performance and longevity.

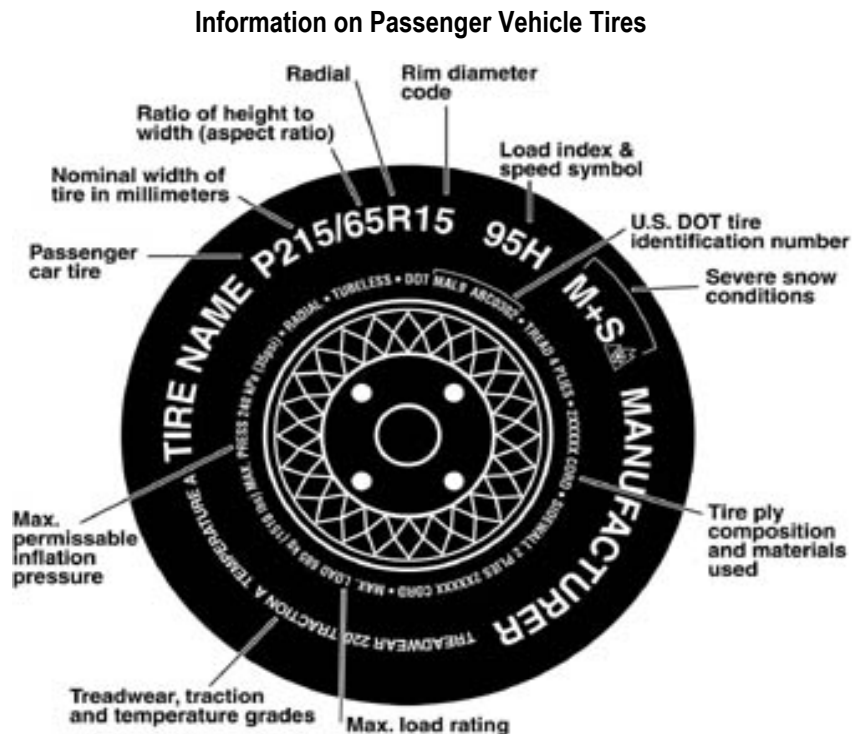
Treadwear grades are an indication of a tire's relative wear rate. The higher the treadwear number is, the longer it should take for the tread to wear down. For example, a tire grade of 400 should wear twice as long as a tire grade of 200.

Traction grades are an indication of a tire's ability to stop on wet pavement. A higher graded tire should allow you to stop your car on wet roads in a shorter distance than a tire with a lower grade. Traction is graded from highest to lowest as "AA", "A", "B", and "C".

Temperature grades are an indication of a tire's resistance to heat. Sustained high temperature (for example, driving long distances in hot weather), can cause a tire to deteriorate, leading to blowouts and tread separation. From highest to lowest, a tire's resistance to heat is graded as "A", "B", or "C".

Tire Fundamentals

Federal law requires tire manufacturers to place standardized information on the sidewall of all tires. This information identifies and describes the fundamental characteristics of the tire and also provides a tire identification number for safety standard certification and in case of a recall.



P

The "P" indicates the tire is for passenger vehicles.

Next number (215)

This three-digit number gives the width in millimeters of the tire from sidewall edge to sidewall edge. In general, the larger the number, the wider the tire.

Next number (65)

This two-digit number, known as the aspect ratio, gives the tire's ratio of height to width. Numbers of 70 or lower indicate a short sidewall for improved steering response and better overall handling on dry pavement.

R

The "R" stands for radial. Radial ply construction of tires has been the industry standard for the past 20 years.

Next number (15)

This two-digit number is the wheel or rim diameter in inches. If the wheel size is changed, new tires to match the new wheel diameter will have to be purchased.

Next number (95)

This two- or three-digit number is the tire's load index. It is a measurement of how much weight each tire can support. This information may be found in the owner's manual. If not, contact a local tire dealer. Note: this information may not be found on all tires because it is not required by law.

M+S

The "M+S" or "M/S" indicates that the tire has some mud and snow capability. Most radial tires have these markings; hence, they have some mud and snow capability.

Speed Rating)

The speed rating denotes the speed at which a tire is designed to be driven for extended periods of time. The ratings range from 99 miles per hour (mph) to 186 mph. These ratings are listed below. Note: this information may not be found on all tires because it is not required by law.

| Letter Rating | Speed Rating |
|---------------|--------------|
| Q | 99 mph |
| R | 106 mph |
| S | 112 mph |
| T | 118 mph |
| U | 124 mph |
| H | 130 mph |
| V | 149 mph |
| W | 168* mph |
| Y | 186* mph |

* For tires with a maximum speed capability over 149 mph, tire manufacturers sometimes use the letters ZR. For those with a maximum speed capability over 186 mph, tire manufacturers always use the letters ZR.

U.S. DOT Tire Identification Number

This begins with the letters "DOT" and indicates that the tire meets all federal standards. The next two numbers or letters are the plant code where it was manufactured, and the last four numbers represent the week and year the tire was built. For example, the numbers 3197 means the 31st week of 1997. The other numbers are marketing codes used at the manufacturer's discretion. This information is used to contact consumers if a tire defect requires a recall.

Tire Ply Composition and Materials Used

The number of plies indicates the number of layers of rubber-coated fabric in the tire. In general, the greater the number of plies, the more weight a tire can support. Tire manufacturers also must indicate the materials in the tire, which include steel, nylon, polyester, and others.

Maximum Load Rating

This number indicates the maximum load in kilograms and pounds that can be carried by the tire.

Maximum Permissible Inflation Pressure

This number is the greatest amount of air pressure that should ever be put in the tire under normal driving conditions.

Uniform Tire Quality Grading System (UTQGS) Information

Treadwear Number

This number indicates the tire's wear rate. The higher the treadwear number is, the longer it should take for the tread to wear down. For example, a tire graded 400 should last twice as long as a tire graded 200.

Traction Letter

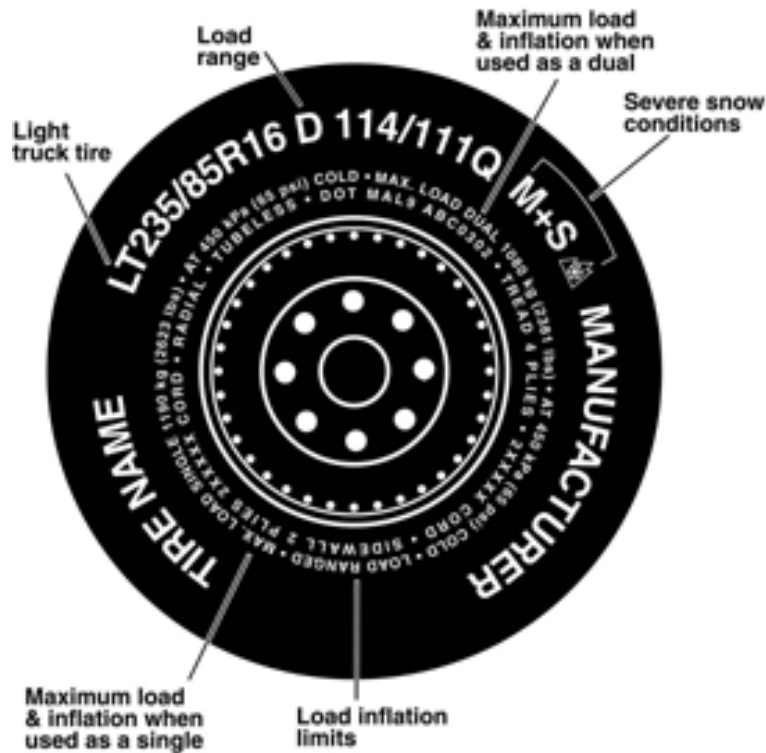
This letter indicates a tire's ability to stop on wet pavement. A higher graded tire should allow you to stop your car on wet roads in a shorter distance than a tire with a lower grade. Traction is graded from highest to lowest as "AA", "A", "B", and "C".

Temperature Letter

This letter indicates a tire's resistance to heat. The temperature grade is for a tire that is inflated properly and not overloaded. Excessive speed, underinflation or excessive loading, either separately or in combination, can cause heat build-up and possible tire failure. From highest to lowest, a tire's resistance to heat is graded as "A", "B", or "C".

Additional Information on Light Truck Tires

Tires for light trucks have other markings besides those found on the sidewalls of passenger tires.



LT

The "LT" indicates the tire is for light trucks.

Max. Load Dual kg(lbs) at kPa(psi) Cold

This information indicates the maximum load and tire pressure when the tire is used as a dual, that is, when four tires are put on each rear axle (a total of six or more tires on the vehicle).

Max. Load Single kg(lbs) at kPa(psi) Cold

This information indicates the maximum load and tire pressure when the tire is used as a single.

Load Range

This information identifies the tire's load-carrying capabilities and its inflation limits.

Snow Tires

In some heavy snow areas, local governments may require true snow tires, those with very deeply cut tread. These tires should only be used in pairs or placed on all four wheels. Make sure snow tires are the same size and construction type as the other tires on the vehicle.

Websites for additional information:

<http://www.nhtsa.dot.gov/cars/rules/TireSafety/ridesonit/brochure.html>

<http://www.dummies.com/WileyCDA/DummiesArticle/id-429.html>

<http://www.tires101.com/tiretech.html>

http://www.kelly-springfield.com/auto/tire_school/safety_guide.pdf