Kansas
RTAP Fact Sheet
A Service of The University of Kansas Transportation Center for Rural Transit Providers

Safety in Ten: Tire Pressure and Wear

By Anne Lowder

"Safety In Ten" *is a new Kansas Trans Reporter regular feature designed as a tool for providing safety talks to your employees. This safety talk should take approximately 10 minutes to complete. To evaluate the effectiveness of this training, have each of your attendees demonstrate the skill.*

Tools needed for this Safety In Ten:

- PowerPoint presentation downloaded from http://www.ksrtap.org
- This handout
- Air pressure gauge
- Tire tread gauge
- Transit vehicle for skill practice

Tire inflation considerations

Advantages of correct tire inflation. Maintaining correct tire inflation pressure helps optimize tire performance and fuel economy. Correct tire inflation pressure allows drivers to experience tire- related comfort, durability and performance designed to match the needs of their vehicles. When properly inflated, tire deflection (the tread and sidewall flexing where the tread comes into contact with the road) will remain as originally designed and excessive sidewall flexing and tread squirm will be avoided. Heat buildup will be managed and rolling resistance will be as designed. Proper tire inflation pressure also stabilizes the tire's structure, blending the tire's responsiveness, traction and handling.

Disadvantages of under-inflation. An under-inflated tire can't maintain its shape and becomes flatter while in contact with the road. If a vehicle's tires are under-inflated by only 6 psi it could lead to tire failure. Under-inflation of tires is a serious safety concern because it forces excessive flexing on the sidewalls. This additional strain on the tire can build up more internal heat, resulting in premature tire failure. Research completed by the U.S. National Traffic and Safety Administration shows that one in three cars or light trucks are being driven with at least one significantly under inflated tire. Improperly inflated tires also wear out more quickly because they put more drag on the road (rolling resistance). Because of this, the tire's tread life could be reduced by as much as 25%. You would also experience a significant loss of steering precision and cornering stability. While 6 psi doesn't seem like much, it usually represents about 20 percent of the tire's recommended pressure.

Above: Can you tell which tire is 30 percent under-inflated? Here's what they would look like in the morning, parked in your garage. Tough to tell, isn't it? Tire pressure must be checked with a quality gauge because the pressure cannot be accurately estimated through visual inspection. The tire on the left is under-inflated.

Disadvantages of over-inflation. An over-inflated tire is stiff and unyielding and the size of its footprint in contact with the road is reduced. If a vehicle's tires are overinflated by 6 psi, they could be damaged more easily when running over potholes or debris in the road. Over-inflated tires cannot insulate road irregularities well, causing them to ride harsher. However, higher inflation pressures usually provide an improvement in steering response and cornering stability up to a point. This is why participants who use street tires in autocrosses, track events and road races use higher than normal inflation pressures. But your transit vehicle will

Some tires have **wear bars,** *that is, rows of nubs that are recessed into the spaces between the treads. If any portion of a tire's tread is worn down to level with the wear bars, it is time to replace the tire. The tire at right is well past that point.*

handle just fine at recommended tire pressures, and your tires will last longer. Again, the pressure must be checked with a quality air gauge as the inflation pressure cannot be accurately estimated through visual inspection.

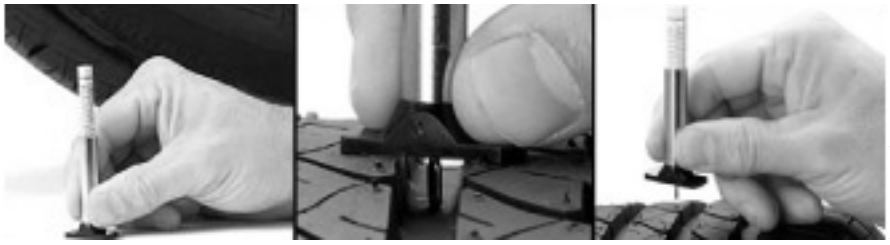
Make checking a habit

To obtain the greatest tire life, keep tires properly inflated at all times. The "right amount" of inflation for your tires is specified by the vehicle manufacturer and is shown on either the vehicle door edge, door post, glove box door or is listed in the vehicle owner's manual. Be sure to check your tire pressure when the tire is "cold" (has not been driven on for three hours or more), which means that the tire is at the same temperature as the surrounding air. Therefore, when a tire is "cold," it is in thermal equilibrium and thus will give an accurate reading of tire pressure.

At a Kansas RTAP driver's workshop, a driver told me his agency gave him a mallet to check tire pressure. If you're a driver accustomed to "thumping tires," you should know that this practice is unreliable and unsafe. An under-inflated tire is extremely difficult to detect by visual inspection or by thumping. Utilizing either of these methods is an accident waiting to happen. Don't guess, don't thump. Measure pressure with a quality air pressure gauge.

Dealing with duals

A vehicle with dual tires has a hidden tire (inner tire position) behind the outside tire. The air pressure valve of an inside tire of dual wheel tire is difficult to reach. This problem can be solved by equipping the tire with a valve extender.



http://www.tirerack.com/

Left, *to use a tire depth gauge, start by zeroing-out your gauge.*
Center, *insert the gauge into a circumferential tire tread and press down.*
Right, *read the gauge and record the tire depth. See detailed steps below.*

Checking the air pressure of the inside tires is an utter necessity and should be done on a daily basis. That's because even if an inside tire is completely flat, it will be supported by the outside tire, but the outer tire is doing all the work. The result is a tire at major risk to overheat, rupture or have the tread releasing from the casing—things that can lead to a major crash.

Tread wear and damage to look for

Tires are designed to grip the road, allowing your vehicle to move, stop, and go around corners safely in any weather. The tread that accomplishes this wears out over time, but drivers can take precautionary steps to prolong the life of their tires.

It is extremely important to check tire tread depth for signs of wear by using a tire depth tread gauge. Proper treads allow for normal handling of your vehicle and help prevent skidding and hydroplaning.

Some tires are manufactured with a row of nubs built into the spaces between the treads—this "wear bar" that tells you when there is less than 1.6 mm (2/32 inch) of tread depth remaining. When the tread wears down so that it is level with the nubs, the tire must be replaced.

Perform regular visual inspections of your tires for signs of damage and excessive wear. Look for embedded objects such as rocks, nails or glass. Catching problems early can save you money and prevent sudden tire failure. Check your tires for signs of irregular tread wear, such as high and low areas or unusually smooth areas.

Steps for using a tread depth gauge

While a penny can be used as a tool to estimate remaining tread depth as a tire approaches the end of its useful life, the established and more accurate method of measuring remaining tread depth in the United States is with a gauge that reads in 32nds of an inch (other countries measure tread depth in millimeters).

To properly measure tire tread depth:
1) Determine what unit of measurement (inches or millimeters) your tire depth gauge uses for measurement and make sure it is the same type of measurement as your tire tread.
2) Push the tread depth gauge against a hard, flat surface to confirm it "zeros out" when fully compressed.
3) Place the probe into the center of a circumferential tire groove (a groove that goes around the tire as compared to a lateral grove from the sidewall to the

Sources

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inside of the tire) and push down on the gauge's base.
4) Record the tread depth reading.
5) Probe additional locations around the tire groove at 15 inches apart and average the readings.
6) Refer to the manufacturer's information about what the tire depth should be to safely use the tire.

In sum

Incorrect air pressure can cause rapid or uneven tire wear. Maintaining accurate air pressure is an important safety and cost-saving practice for your transit agency. An accurate tread depth gauge reading and visual inspection of the tire and the tread's depth in relation to the wear bars will help detect signs of wear. Also look for embedded objects. Early detection of a problem with a tire can save you money, increase vehicle safety, and prevent tire failure.

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