FIRE APPARATUS TIRES BEST PRACTICES

Tires are literally where the rubber meets the road. Every firefighter knows the importance of good tires, or do they? This bulletin will define a 'good tire' and a 'good inspection program' of the apparatus's tires. Routine apparatus inspections are common within fire stations. It's a common misconception there probably isn't a problem if a tire does not appear flat. A tire inspection is a multi-faceted task that includes weekly checks and an annual examination by a qualified technician.

Treadwear and Air Pressure

Every week, firefighters should conduct the following inspection:

- Check tread depth with a tread gauge. Look for uneven or unusual tread wear.
- Check tire pressure with a gauge, including the inner tire of dual tires, and record pressures on the checklist.
- Check for obvious defects, such as sidewall damage from rubbing against a curb or a nail in the tread.
- Inspect rims for damage and ensure the tire valve stem caps are in place.
- Ensure lug nuts are present and tight. A Best Practice is to install lug nut flags to identify loose lug nuts quickly.

Although most state and federal standards require at least 4/32 of an inch on the front tires and 2/32 of an inch on the rear tires, studies have shown that tires significantly lose their effectiveness when tread depths are more shallow than 5/32 of an inch. **A best practice is to require firefighters to add the tread depth on their weekly inspection reports and adopt an organizational policy that 5/32 of an inch as the point when tires will be replaced.**

Many believe the correct air pressure is the pressure printed on the tire's sidewall. The figure is the maximum air pressure in the tire to support the maximum load, not the recommended tire pressure for the apparatus. To determine the recommended tire pressure for your apparatus, check the service manual or the tire load and inflation table. The tire load and inflation information is based on the weight of the apparatus (including firefighters, water, and equipment). **A best practice is to weigh the apparatus and refer to the tire load and inflation pressure chart provided by the tire manufacturer to determine the proper air pressure for the tires.**

Some also believe a tire blowout results from too much air in a tire; this is not the case. The two most common causes of tire blowouts are underinflated or overloaded tires. The tire's structure does not support the weight of the apparatus; the air inside the tire supports the weight of the apparatus. An under-inflated tire does not have enough air pressure inside to support the weight of the apparatus. When this occurs, the sidewall of the tire takes over the job of supporting the apparatus's weight. When checking tire pressures, "Cold Tire Pressure" refers to the fact that the tire has not been driven on for the past three hours.

Dry Rot

Weekly tire inspection must also include a visual inspection for evidence of dry rot, otherwise known as sidewall cracking. If unnoticed, tire dry rot can lead to serious safety problems. When tires dry rot, they usually show small hairline cracks in the sidewall or treads of the tire. **A best practice is to include the presence of sidewall cracking on the weekly inspection checklist.**

Tires naturally degrade over time because they are made from rubber. When a tire ages, it loses the protective resin, which keeps the rubber from oxidizing and drying out. As those oils evaporate, the tire becomes brittle, develops cracks, and breaks apart.

There are many causes of tire dry rot. Improper inflation, exposure to excessive heat, constant exposure to direct sunlight, and long periods of inactivity are all known to cause dry rot in tires. There are also some things the fire

organizations can do to help prolong the life of their tires. Avoid harsh chemicals; use only mild detergent and water to clean tires. Solvent or petroleum-based tire shine products can be harmful to the tire. The chemicals in these products replace the natural moisture in the material with oil-based substances and will eventually dry the tire out.

Do not drive on tires with suspected dry rot. Have your tire manufacturer's representative inspect the tires before continuing their use.

In addition to weekly inspections, **a best practice is for fire organizations to have their tires inspected yearly by a qualified inspector.** Specifically, ensure the inspector addresses the following two items in their written report.

Overloading

One area that is often overlooked is the increasing amount of equipment carried on the apparatus and the effect on apparatus weight. It is easy to add a rescue tool to the front bumper tray or put some airbags and cribbing in a compartment. Then comes a high-rise pack and maybe tool boards. Before you know it, a few hundred pounds become several thousand pounds. It is important to have your apparatus weighed to avoid becoming a safety and liability hazard by operating an overweight apparatus.

NFPA 1901, Standard for Automotive Fire Apparatus, includes standards for estimating equipment and hose weight allowances on a fire apparatus. Table 12.1.2 gives the miscellaneous equipment allowance for all types of apparatus. For engines, there are two categories:

- Pumpers with less than 250 ft3 compartment space: total allowance 2,000 lb.
- Pumpers with more than 250 ft3 compartment space: total allowance 2,500 lb.

If you do not inform the apparatus manufacturer otherwise, the equipment capacity listed in Table 12.1.2 will typically be used to calculate the in-service weight of the apparatus. This may or may not accurately reflect what you carry on your pumper, or, if it was accurate when the engine was designed, it may no longer reflect years of modifications, especially as departments must do more with less.

Apparatus manufacturers will generally distribute the equipment weight evenly over each compartment. Again, this may not be accurate after years of modifications. The location of equipment relative to the front and rear axle can affect the size (Gross Axle Weight Rating) requirements for each axle. NFPA 1901 requires that the fully loaded apparatus shall not have a side-to-side tire load variation greater than seven percent (7%) of the total tire load for that axle. Not maintaining a balanced side-to-side loading can result in a chassis lean and possible handling issues with the apparatus.

Overweight apparatus may not have the proper tire pressure for the weight of the apparatus and will adversely affect braking distance and brake wear.

A best practice is weighing the apparatus and each tire individually to ensure the weight is within Gross Apparatus Weight (GVW) and distributed front-to-back and side-to-side.

Age of Tire

Check and record the age of every tire by looking at the sidewall of the tire. This includes the inside dual tires and the tires on the trailers and specialty apparatus, which may be sitting outside the firehouse or sitting for extended periods.

If the tire was made after the year 2000, there will be a four-digit code on the side of the tire that will tell you when the tire was manufactured. The first two digits are the week of the year, and the last two digits are the year the tire was made. For example, if the four-digit code reads "2515," the tire was manufactured during the 25th week of 2015. If there is only a three-digit code, the tire was produced before 2000. **If you have a tire with a three-digit code or no code at all, it is recommended replacing it immediately.**

National Fire Protection Association (NFPA) 1911, Standard for the Inspection, Maintenance, Testing, and Retirement of In-Service Emergency Apparatus, 8.3.6 states that tires must be replaced every seven (7) years or more frequently

as needed. In addition to the possibility of serious injuries and fatalities, imagine the liability a fire department may face if it was operating a fire apparatus with "expired" tires. For a more comprehensive discussion regarding the issue of tire replacement, read the final NFPA final report titled Automotive Fire Apparatus Tire Replacement.

On ambulances and civilian apparatus, tires should be replaced every ten (10) years or the mileage life of the tire, whichever is sooner.

Fire service leaders must equip firefighters and apparatus mechanics with the knowledge, skills, tools, and mindset to conduct comprehensive tire inspections. Leaders cannot assume firefighters know how to inspect tires. As the saying goes, you get what you make. Take the time to create firefighters who can determine a 'good' tire and conduct a 'good' tire inspection.

Lastly, when performing routine apparatus inspections, encourage firefighters to check their personal vehicles.

References

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