



## **Tire Safety - How the Rubber Meets the Road**

With warm weather upon us and the beginning of the busy summer travel season, it is an excellent time to discuss vehicle tire safety.

The key element in minimizing the likelihood of a potential tire failure/tread separation is following the vehicle manufacturer's recommended tire pressure. An improperly inflated tire can/will generate excessive heat.

Tread separation is a term widely used to describe many different scenarios of tire "failure." Tread separation, as defined by the National Highway Traffic Safety Administration (NHTSA), is the pulling away of tread from the tire carcass. There are many other separation failures including cord separation, cracking, inner liner separation and ply separation.

As mentioned above, a common component in all of these tire failures is excessive heat caused by improper inflation of the tire(s). Here is why:

An under inflated tire will support less of the vehicle weight with the air pressure in the tire; hence, more of the vehicle weight will be supported/transferred to the tire. This increase in weight will cause the tire to have a larger contact area/patch with the road surface thereby creating more friction and more heat. Operating a vehicle with under-inflated tires can result in friction and heat and cause the aforementioned failures.

An over inflated tire is an unsafe condition because too much of the vehicle weight is supported by the tire air pressure. The vehicle will be harsh/bouncy and hard to steer because only the center portion of the tire is contacting the road surface.

In a properly inflated tire, approximately 95% of the vehicle weight is supported by the air pressure in the tire; the remaining 5% is supported by the tire, so there is a nominal amount of heat generated as a result of the friction created from the tire contacting the road surface.

The issue with today's radial tires, used on almost every passenger vehicle, is the tire can lose much of its air pressure and still appear to be fully inflated. Photo 1 is a tire properly inflated to 30 pounds per square inch (psi). Photo 2 is the same tire inflated to 15 psi.; there is hardly a discernable difference. This demonstrates how important it is to check the tire pressure with a tire gauge once a month as recommended by NHTSA to ensure the tire is inflated to the specific pressures recommended by the vehicle manufacturer. The recommended tire pressures can be found in the owner's manual, or on a placard usually located on the driver's door jamb or gas door.

An important note: The pressure rating on the tire is the maximum operable pressure, not the recommended vehicle manufacturer pressure. NHTSA recommends checking the tire pressure at least once a month with a tire gauge.

Next month's newsletter: Tread separation issues: how and why they occur.

**Do you have a matter requiring forensic investigation or a question about your case which can be answered by a professional engineer, architect or industrial hygienist?  
Call us anytime at 610-747-0675 or email us at [experts@plickandassociates.com](mailto:experts@plickandassociates.com)**

### **Joke Of The Month**

**Q: When does a person decide to become an engineer?**

**A: When he realizes he doesn't have the charisma to be an undertaker.**



**Photo 1**



**Photo 2**

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# LIGHTNING - NATURE'S INSIDIOUS AGENT

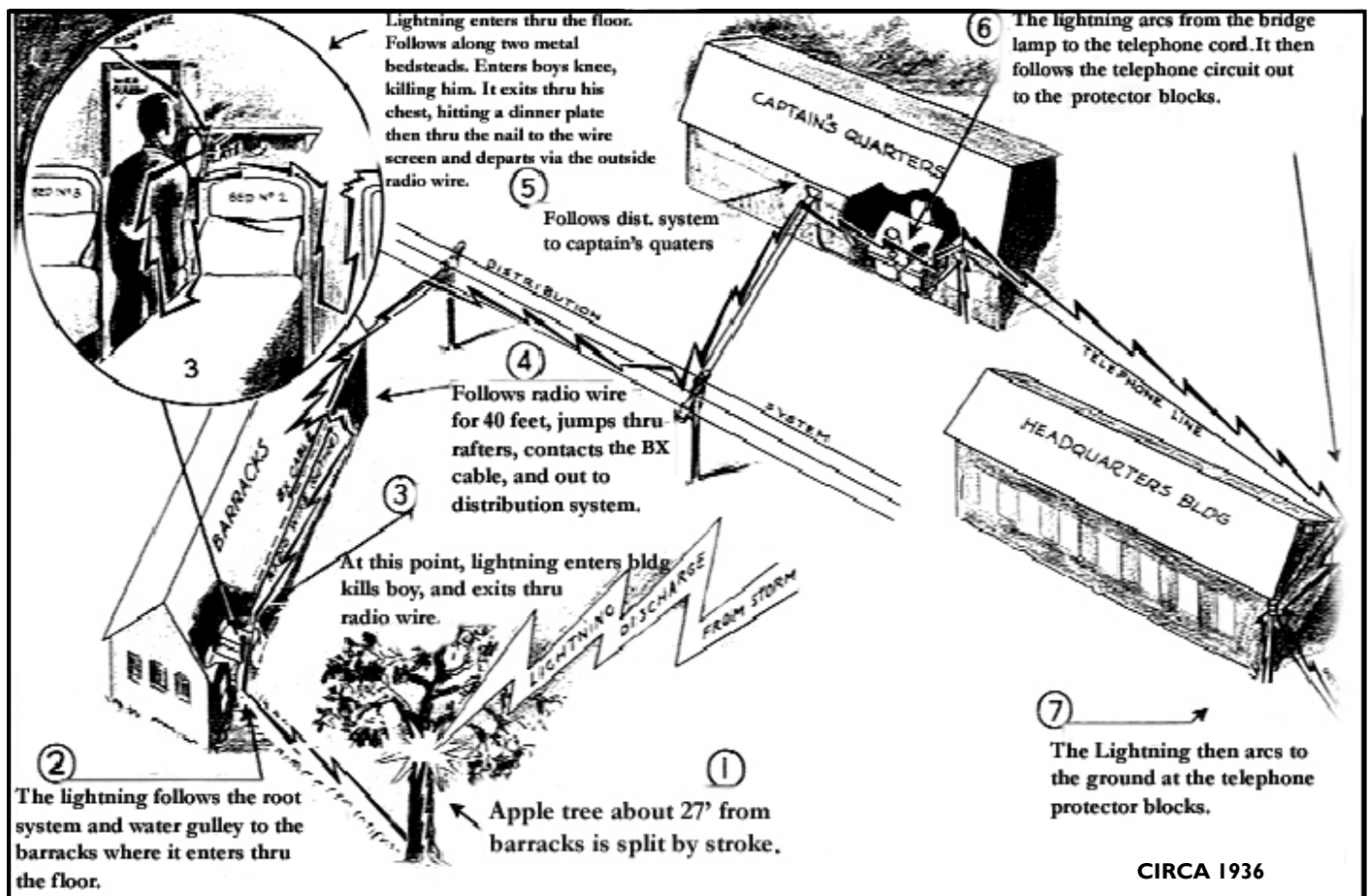
Lightning is a frequent cause of fire and the consequential loss of property, personal injury and/or death. According to the U.S. National Weather Service, 73 people die from lightning strikes each year. Hundreds more suffer serious injuries.

Lightning is essentially a colossal "electric spark" that jumps from cloud to cloud or from cloud to earth. The damages from a lightning strike almost always involve the jump between cloud and earth. The lightning strike is a magnitude in excess of tens of thousands of volts. Upon striking the earth or an object, enormous voltage surges are generated with the creation of tremendous thermal energy. The consequences are the damages we attribute to lightning activity.

Lightning is devious. It can strike at one point and emerge at several other locations to inflict more havoc. An excellent example is the lightning strike at a youth work camp circa 1936. This well documented incident is as relevant today as it was then. It's presented here as an excellent example of the dangerous behavior of lightning.

The initial lightning strike hit an apple tree (1) approximately 27 feet from the barracks. It followed the root system and water gully (2) entering the first floor of the barracks. It killed a boy (3) and exited through a radio wire for 40 feet, finally emerging through an electrical cable (4). The path along the cable allowed the lightning strike to follow the electrical wiring outside of the barracks and enter the captain's quarters (5). The strike continued to a lamp and arced to a telephone circuit (6). It followed the telephone line until it arced to ground in the headquarters building (7).

Future articles will address protection against lightning, type of damages from lightning, and non-lightning induced voltage surges. In addition, upcoming articles will discuss guidelines in determining actual lightning damage or fraud.





## A Little Crack Can Mean Big Problems, Part 2 of 2

In the last edition of the newsletter, part 1 of this article discussed common foundation failure issues, part 2 continues this discussion. Many newer homes have foundation drains at the base of their foundations. These drains consist of perforated pipe laid in a bed of gravel. The gravel is protected by a layer of special construction cloth called filter fabric. The perforated pipe conducts water to a sump pump or drains the water away by gravity. Any blockage or failure of the piping, or clogging of the filter fabric and stone bed with silt can prevent proper drainage and cause an increase in hydrostatic pressure.

Other causes of basement wall failures are related to later construction at a property such as excavation at the exterior of the wall or removal of the adjacent concrete floor slab during installation of a basement drying system. The operation of heavy equipment too close to a foundation wall can also result in damage.

The failure of a masonry block basement wall can be catastrophic, resulting in property damage, injury or death. Such failures are always disruptive, expensive, and difficult to repair. Home or building owners, and persons evaluating structures such as home inspectors or insurers, should be on the look-out for conditions which can lead to such a failure and the tell-tale signs that indicate such a failure may be underway.



### Engineer Spotlight

Mark Suchecki is an internationally recognized forensic civil and structural engineer who has practiced with Michael Plick and Associates since 1998. He was raised in Dayton, Ohio, and in 1978 received his Bachelor of Science Degree in Civil Engineering from the University of Cincinnati. For twenty years Mr. Suchecki practiced with national consulting firms in Louisville, Kentucky, Washington, DC, and Philadelphia, PA. This experience included soils and foundation engineering, materials engineering, and strength evaluation of existing structures, including non-destructive evaluation techniques. Mr. Suchecki managed numerous branch offices and laboratories employing engineering and technical professionals.

In the 1990s, Mr. Suchecki extended the realm of his engineering assessments to include underwater inspection of waterfront and waterway facilities. Utilizing surface-supplied air systems and commercial hard-hat diving gear, he has performed investigations into the condition of structures ranging from Guantanamo Bay, Cuba, nuclear submarine bases in Pearl Harbor and Bangor, Washington, to bridges over the Niagara River and St. Lawrence Seaway, and to locks and dams along the Erie Canal System in New York State.

At Michael Plick and Associates, Mr. Suchecki brings his breadth of engineering experience to the investigation of failures in buildings, structures, engineered products, and construction processes. He evaluates cases involving personal injuries or monetary damages allegedly due to the serviceability or component failure of buildings, facilities, and manufactured products. Mr. Suchecki has been accepted and testified as an expert witness in federal and municipal courts and in arbitration proceedings.

Mr. Suchecki resides in the historic neighborhood of Drexel Park, Delaware County, just west of Philadelphia, and has lived there with his family since 1990.



## Introduction To The Hot Water Storage Tank

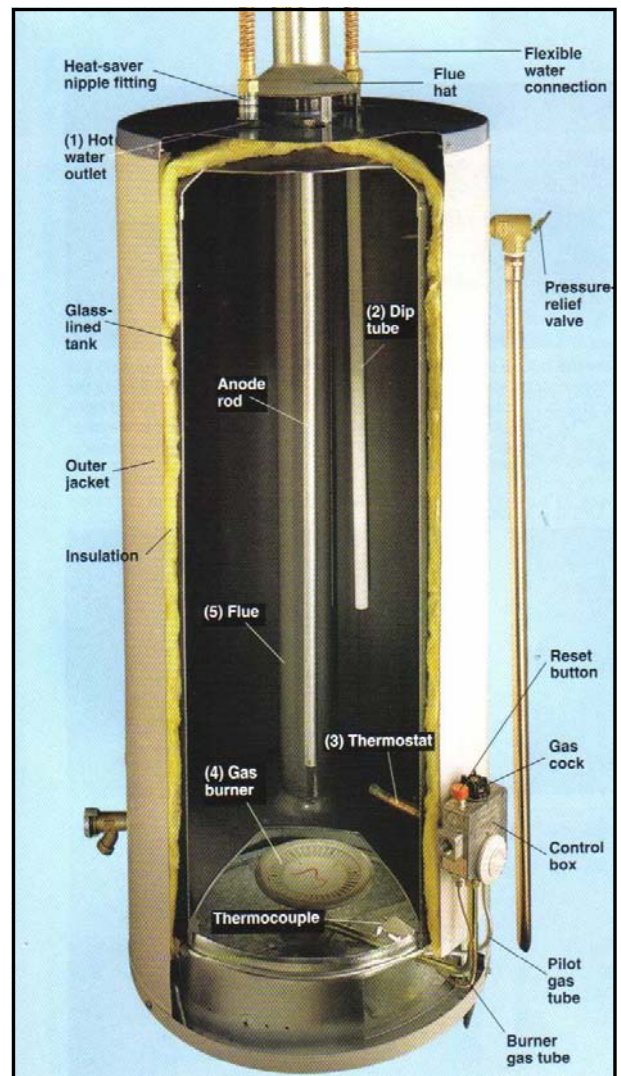
Every home has a water heater for daily needs. Water heaters are made in different sizes and shapes but they all share the common purpose of heating water. Every water heater has the same basic components: a cold water inlet, hot water outlet, heat source, Temperature & Pressure relief valve and a drain valve (See figure). Cold water enters the water heater through the cold water piping system via the cold water inlet. A dip tube is usually required on the cold water inlet to direct the cold water away from hot surfaces. If the cold water contacts a hot surface, thermal shock will result and the water heater will fail. The cold water inlet is often identified with the color blue. The hot water outlet is often identified with the color red.

The water heater is made with a steel inner tank covered by insulation and an outer jacket or light metal cover. The steel tank usually has a liner of some type to reduce steel joint corrosion. Small water heaters usually have an anode rod, also called a sacrificial rod, which will corrode, inhibiting damage to the water heater, heating element(s), control or safety equipment, and heating elements. As the sacrificial rod deteriorates, sediment will form and accumulate on the bottom of the water heater.

The sacrificial rod should be replaced periodically to protect the water heater and components. The sediment, regardless of whether it is from the sacrificial rod or the water heater, should be removed by flushing the water heater once each year. This is accomplished through the drain valve located on the bottom of the water heater.

Water is heated in the water heater by either a gas burner, oil burner, or electric heating elements. A thermostat and temperature regulator maintain the water at a preset, desired temperature. The flue pipe and exhaust stack gas or oil fired water heaters must be kept clean. All combustible material must be kept a safe distance from any gas or oil fired water heaters. A Temperature & Pressure relief valve is required for all water heaters. On very large apartment water heaters, two Temperature & Pressure valves may be required.

Hot water exits the water heater and proceeds through the hot water distribution system for use in the home.





## Plick and Associates, Forensic Engineers On The Road!



Plick and Associates, Forensic Engineers, are just back from Nashville, TN, this year's home for the Property Loss Research Bureau's Annual Conference. Shown above is Sidney Rubin, P.E., C.F.E.I. giving a presentation on lighting strikes. The crowd truly enjoyed this unique look into the unpredictability of one of nature's most dangerous manifestations.



In June, Plick and Associates, Forensic Engineers, will be on the road once again giving presentations at two conferences. The first will be at the Pennsylvania Chapter of the International Association of Arson Investigators at the Pennsylvania State Fire Academy. As part of their presentation, they provide hands-on operation and failure analysis training for gas and oil fired appliances. Then, on June 26th, we will be speaking at the International Symposium of Fire Investigation Science and Technology this year being held at the University of Cincinnati, OH. The topic of that presentation will be, "What Is Fire?", which is sure to really heat-up this year's attendees!

**Plick and Associates, Forensic Engineers loves to hear from its newsletter readers. Please call or e-mail us at [experts@plickandassociates.com](mailto:experts@plickandassociates.com) with article suggestions or feedback.**