

Firehouse.com WEEKLY DRILL

DRILL # 42: HEAT SOURCES

Introduction

Heat sources are confronted on a regular basis in the fire service. As such, firefighters need to study the four basic sources of heat to stay on top of their game. The sources are: electrical; mechanical; chemical; and nuclear.

Electrical

Electricity is one source of heat that is probably the most recognizable to firefighters because we use it in our daily living to operate our electrical appliances, heat the home and even cook with. As electricity flows, it creates energy or heat.

Flowing electricity is nothing more than electrons moving from one place to another, generally from an area with more electrons to an area that has less. The funny phenomenon about this flow is that the area where electrons are in greater numbers is known as being “negatively charged” and the area that holds a lesser number of electrons is known as being “positively charged.” Knowing this helps us understand electricity better, because it is always trying to equalize; sending electrons from areas having more to areas having fewer electrons usually through an electrical conductor or conduit.

So where exactly does the heat come from? The flowing electrons, which are traveling through the conduit, are independent of one another and are trying to bond. This bonding takes place between the negative and positive charges. During all this activity, the electrons smash into each other causing a breakdown in the molecules. It is at this point in time that the bond is allowed to break and releases the heat. If the conductor cannot be insulated sufficiently, it can overheat and combustion can occur, causing a fire.

Some of the different forms of electrical heat firefighters might be confronted with are: arcing and sparking of electrical outlets and wires; static electricity; and lightning. Don't be fooled by static electricity! It's not just a small jolt that one receives from touching an object after walking on a rug in your socks. Temperatures from static electricity can range in excess of 2,000°F.



Mechanical

Friction is the primary cause of mechanical heat. Friction can heat combustible material up enough that they catch fire, which is usually the case with most fires in machine shops. In general, friction is caused by the rubbing together of two materials. In an effort to stop or slow down this build up of heat, some sort of coolant is used, whether as simple as water, oil, or a more complicated method involving a chemical solution.

Chemical

Again, this is a very common source of energy that is being used every day. As firefighters we have heard a lot about chemical reactions. Every firefighter who has taken a class on fire behavior is taught about chemical reaction being the fourth side of the fire tetrahedron.

Nuclear

Nuclear energy has been used for years in power plants and weaponry. In fact, it is still a hot (no pun intended) topic today in dealings with Iran. The main concern here is the radioactive material associated with nuclear energy. The thing firefighters have to realize is there is little they will be able to do to safely fight a fire stemming from a nuclear heat source.

At any rate, removing the heat source will allow firefighters the upper hand in then being able to extinguish the fire.

—Prepared by Russell Merrick