

THE “NEON SIGN” FIRE

Neon, from the glitz and glitter of your favorite night club or restaurant to the glow in the distance of the motel you are trying to find on that rainy night, the neon is very versatile and economical. When used for neon and electric signs or general and outline lighting applications, such signs usually require a small amount of maintenance. Neon tubing is still mostly hand-fabricated, processed with inert gases (neon, argon and mixtures of the two) and powered by high voltage and in some cases high frequency.

Neon tubing and signs are generally safe and trouble-free when installed and maintained in conformance with the National Codes and Standards. (NEC National Electric Code, UL Underwriters Laboratories Standards UL 48 Electric Signs).

Neon signs and outline lighting in disrepair or left non-operational for any amount of time is a prescription for fire.



Neon signs are powered by high voltage and the wiring must be contained, loaded and installed properly, especially when a fault (outage) occurs. Neon signs operate at voltages up to 15,000 volts. The voltage is very high in these installations, but the current is low (in the 30-60 milli-ampere range). This means that electrocution is normally not the hazard, but the static electric field, once in contact with ground, creates a breakdown in the secondary circuit wiring insulation and dielectric properties of the system.

Fixture and equipment grounding in the neon sign system is very important in containing or controlling a fault, and especially in the activation of the secondary circuit ground fault in the power supply now required in newer installations and preventing stray energy from causing a fire. Secondary-circuit ground fault protection has been required in field-wired systems since 1996 and in Listed signs since 1999. These systems, when properly installed, should dramatically reduce the number of neon sign fires. These systems are not fail-safe and actually require an arc track or fire to start before they activate.

Systems not properly installed complete with equipment grounding and bonding may not sense the fault and not operate in the event of a fire or fault.

The systems do not detect open circuit or broken neon conditions until they arc-fault back to the power supply. When this condition exists and stray electrical activity encounters combustibles in route, could start a fire without the power supply interrupting the secondary circuit because it did not sense the fault.

Signs and outline lighting are usually controlled by a photo cell or a time clock and may be operational while no one is at the facility. Remote wired channel letters, outline lighting systems, window signs and the like have high voltage power supplies and secondary wiring concealed in ceiling spaces, mansard walls, loft and attic areas not readily available or visible.

The problems that occur in many locations is a neon sign or outline lighting system can become inoperative or be in a fault condition after hours or when the store is closed. This condition can cause some electrical activity to go undetected on combustibles behind the wall or in concealed spaces, which can smolder and start a fire. Unfortunately, the fire can grow in size and spread without detection. The fire will either be exposed and spectacular or become well involved behind the wall or in concealed spaces before it is discovered by authorities on patrol or a passer by and reported.



Generally these areas contain remote wiring, lighting, HVAC equipment, alarm and security systems, and other possible ignition sources. These areas are generally destroyed by the fire and pin pointing the exact ignition source becomes difficult. Also during suppression and overhaul the fire department may remove, relocate or destroy pertinent parts needed to pin point the ignition source. The owners in their haste to restore the building may remove and destroy critical parts and pieces or relocate them.

All of these conditions hamper the investigators and experts in identifying the exact ignition source quickly. Many times when I arrive most of the damaged area is in a dumpster.

Building codes today refer to signs for certain structural requirements, wind loading and other requirements including electric signs are to be installed in conformance with NFPA 70 the National Electric Code.

The National Electric Code, Article 600 requires the following:

600.3 Listing. Electric signs, section signs, and outline lighting — fixed, mobile, or portable — shall be listed and installed in conformance with that listing, unless otherwise approved by special permission.

(A) Field-Installed Skeleton Tubing. Field-installed skeleton tubing shall not be required to be listed where installed in conformance with this code.

(B) Outline Lighting. Outline lighting shall not be required to be listed as a system when it consists of listed luminaires (lighting fixtures) wired in accordance with Chapter 3.

(reprinted from 2005 NEC)

Listed neon and electric signs and outline lighting systems have the highest degree of safety and are the least likely to start a fire.

Unfortunately, enforcement is lacking in many parts of the country. In my best estimates there are about twenty-nine or thirty thousand companies that can either build, install, service or maintain an electric sign. The Listing agencies (UL, MET, Intertek, etc.) list less than 3,500 companies collectively, that are able to produce Listed and labeled electric and neon signs. The listed companies, some being major sign producers will account, in my opinion for about 30-40% of the signs built and installed. (Major car companies, motels, franchises, etc.) Now, have I ever worked on a listed neon or electric sign fire and the answer is yes, not the majority but it does happen.

In closing, neon and electric signs need to be listed and labeled. The local (AHJ) Authority Having Jurisdiction (electrical inspector) needs to be prepared and trained to inspect the field wiring and connections on these types of installations. The electrical inspectors have a great resource with their national association, (I.A.E.I) International Association of Electrical Inspectors. The association has written a publication called “Neon Lighting” which is a great book to assist them in inspecting these installations. I did review and contributed to the publication, at their request, before it was printed and it is excellent. They also provide classes on the book and train their inspectors. Local inspection is the last line of defense and needs to be encouraged.