C22 Temperature Tests on Halogen Lamps

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After attending this presentation, attendees will gain knowledge about the dangers and temperatures of halogen lamps and their propensity to start fires.

This presentation will impact the forensic community and/or humanity by revealing the fire propensity available when halogen bulbs are used in lamps.

Halogen lamps come in a variety of shapes, sizes and wattage options. These lamps are available for a variety of applications including medical and dental, car lamps, as well as household and shop lights. These lamps are filled with halogen gas, which reacts with the lamp filament producing a brighter light source than an incandescent light bulb. Generally, halogen lights are more efficient and have a longer life span than incandescent light sources and are designed to fit most applications. Typical wattage of halogen lamps ranges from 10 watts at 6 volts to 5000 watts at 420 volts. Many of the household type halogen lamps are classified according to their tubular double-ended shape as T-3. This investigation centers on test measurements conducted on T-3 style halogen lamps and a comparison to standard incandescent lamps.

A standard incandescent light bulb in the 60 to 75 watt range produces temperatures that vary over the surface of the bulb. At the base the temperature is approximately 120° F while at the maximum radius the temperature climbs to 180° F. This temperature at the maximum radius of the bulb explains why, although very hot to the human touch, a lit incandescent light bulb can generally be unscrewed from its socket and changed. Surprisingly, the temperature at the very top or tip of a standard incandescent light bulb is approximately 350°F. Tungsten-halogen lamps are also incandescent (filament) lamps but are significantly different from standard or conventional lamps in size and design. Halogen lamps operate on the practical application of the halogen regenerative cycle in filament lamps. Iodine and bromine gas, members of the halogen family of gases, are the most commonly used fillers for these lamps. As the lamp burns, the halogen gas combines with the tungsten that is evaporated from the filament. The circulation of the gas inside the bulb deposits the tungsten back on the filament instead of inside the bulb wall. This regenerative effect keeps the bulb wall clean and allows the lamp to essentially deliver a constant light output throughout its life.

In comparison to standard filament lights, halogen lamps may achieve bulb temperatures in excess of 900° F. Consequently, most halogen light fixtures have supposed safety features that isolate the bulb from the surroundings by the use of lenses or guards. In some of these halogen lamp designs, the lenses or guards are insufficient so that significant temperatures may be achieved that will ignite combustible materials such as clothes and paper. Owing to the lamp temperatures, halogen lamps use quartz rather than glass for the lamp bulb. Tests conducted on halogen lamps varying from 150 watts to 500 watts revealed a serious risk of fire on two common light fixture designs.

Halogen Lamp, Temperature, Ignition

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