



INDIANAPOLIS-MARION COUNTY FORENSIC SERVICES AGENCY

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EVIDENCE SUBMISSION GUIDELINE #1

AUTOMOBILE LIGHTS

INTRODUCTION

This bulletin is intended to assist you in understanding some of the basics in lamp examinations. The primary purpose of a lamp filament examination is to determine whether a lamp was lighted or unlighted at the moment of impact or breakage. The filaments of incandescent bulbs can sometimes give data that can answer this question. Incandescent bulbs are basically your average everyday light bulb. The filament is a tightly coiled wire that is strung across two support posts. The filament is made of tungsten which is a very hard material and has a bright luster appearance. Filaments may be arched or straight between the support posts. There may also be more than one filament enclosed within the glass housing. This allows the bulb to possess multiple functions. The tungsten filament of a vacuum incandescent lamp is heated to temperatures where visible light is emitted by resistance heating. The filament acts as an electrical resistor, which dissipates power proportional to the voltage applied times the current through the filament. When that power level is sufficient to raise the temperature to above 1000 degrees Kelvin, visible light is produced. The tungsten filament evaporates more rapidly as the temperature of the filament goes up. The evaporated tungsten particles tend to deposit on the glass envelope causing an increase in light absorption over time. Depending on the application, the light output obstruction could be high enough to end the useful life of the lamp. Eventually, the filament material will evaporate enough to cause the filament to break, completely ending the life of the lamp.

A. SAMPLING, COLLECTING, PRESERVING, AND MARKING:

The procedures below pertain to handling vehicle lamps for laboratory examination.

1. SCENE INVESTIGATION: Determine whether the light switch is “ON” or “OFF”. DO **NOT**, under any circumstances, turn the switch “ON” if in the “OFF” position. Also check the possibility of blown fuses, broken wiring, and dead batteries. If possible, hand carry the evidence to the IMPD Property Room observing the following guidelines when you send the material for examination:

B. PACKAGING:

1. Intact lamps may be submitted as is, well packed with soft cotton or paper, cushioned in a rigid box.
2. Broken lamps:
 - a. All available auto lamp glass fragments from the scene must be collected for laboratory examination. A physical match of the broken glass to glass remaining in the headlamp of a hit and run vehicle can sometimes be achieved. This positively links the vehicle to the scene.

- b. Carefully dismantle the lamp assemblies insuring that all filaments, filament posts, and glass are included. Whenever possible or practical send in the whole assembly so that the least amount of physical damage is done. The lamp mounting brackets and its hardware may need to be removed.
 - c. If the glass envelope is broken, observe the filament location and determine if the filaments are attached to the filament posts.
 - d. Attempt to locate the filament if unattached since most of the important information is detectable only with the filament.
 - e. Carefully package separated posts and filaments. Use disposable foam coffee cups or small cardboard boxes to prevent further damage. Use cotton gauze or tissue padding if needed.
 - f. SEPARATELY package the very fragile items from the scene and from the vehicle. Each item for laboratory examination must be identified by vehicle and position of origin on the vehicle.
 - g. All lamps in the damaged areas should be collected and submitted to the laboratory for analysis. In some circumstances, with no filament present, a conclusion of off or *on* can still be determined.
3. Properly mark the sealed package and identify the contents using appropriate markings. When available it is best to include a copy of the accident report and accident photographs depicting the position of each submitted lamp and the overall damage of each vehicle.

C. CONCLUSIONS

The procedure does have its limits. The effects of a collision on a lamp filament will vary greatly depending on the conditions of the lamp at the time of impact. Hot and cold lamps will produce different results. Factors including impact severity, filament size, temperature, age, as well as whether or not the glass was broken, will play a role in the amount and type of deformation a filament will experience. The severity of the impact and damage to the vehicle also determines what evidence will be recovered for examination.

Bulb investigation is rarely as clear cut as this might suggest. It is often a case of drawing on extensive experience and weighing up several features of the lamp. Filaments can sag with age or may be arched during manufacture leading to misdiagnosis of a hot shock failure; blackened bulbs can be misinterpreted as having been blackened by oxidation. Caution must be exercised when stating certainty in any result, especially when apportioning blame. It is also very important to realize that any damage may not have been caused by the accident in question but could have been the result of a previous incident. However in saying this, forensic lamp examination can prove valuable in crash investigations

EXAMPLES of CONCLUSIONS

Examination of Item (####) revealed physical characteristics that are consistent with the bulb having been energized at the time of impact.

Examination of Item (####) revealed physical characteristics that are consistent with the bulb having not been energized at the time of impact.

Examination of Item (####) revealed insufficient physical characteristics to determine if the bulb had been energized at the time of impact.

LABORATORY INVESTIGATION: If sufficient evidence is submitted (including the filament or portions of it), laboratory examination can often determine whether a lamp or a particular filament was on or off at the time of accident.

For further information you may wish to consult with the I-MCFSA Laboratory.
The laboratory number is: 317-327-3670.

Evidence Submission Guideline #1 adapted from Indiana State Police Laboratory Physical Evidence Bulletins.