C H A T H A M F I R E R E S C U E

detecting smoke

PHOTOELECTRIC VS. IONIZATION

A Home Safety Update **June 2008**

Knowing the difference is critical!

HOW SMOKE ALARMS WORK:

Ionization. The ionization smoke detector uses a radioactive source (typically Americium-241) to ionize the air within the sensing chamber. The ionization of air by the radioactive particle causes a very small flow of electrical current. When smoke from a fire enters the chamber, its presence causes a reduction in the current's flow. The electronic circuitry senses the reduced flow and triggers the alarm horn.

Photoelectric. Photoelectric smoke detectors use the principle of scattered or reflected light to indicate the presence of visual smoke. When smoke is present in the chamber, a photocell located at right angles to the light source senses the light scattered off the smoke particles and, at a certain level of illumination, triggers the alarm horn.

HOW DO THEY COMPARE:

Both detectors sense the presence of smoke. If a fire starts and slowly smolders in upholstery without visible flame, a good photoelectric unit would be superior to a good ion chamber detector in terms of detection time. But, if the fire has flames, a good ion chamber will detect it somewhat faster than a good photoelectric detector.

HERE'S THE BAD NEWS:

Several studies have shown that ionization detectors may not sound early enough to permit escape.

A Boston Fire Department and WBZ Channel 4 investigate report www.wbztv.com/iteam/local_story_186210454.html shows photoelectric smoke detectors activating 9 minutes sooner than an ionization type detector in a smoldering fire (the kind of fire which leads to deaths). An additional test of a flaming fire showed the ionization detector sounding first, but by only 14 seconds faster than the photoelectric detector.

For an additional review of detector performance: Visit: www.theaquariumtest.com

The Massachusetts Building Code recognized the difference in detector performance several years ago.

Code excerpt: 780 CMR 919.3 states: "Where required**: Single and multiple station smoke detectors or household fire warning systems shall be installed and maintained in full operating condition in the locations described in 780 CMR 919.3.1 through 919.3.3. **Any smoke detector located within 20 feet of a kitchen or within 20 feet of a bathroom containing a tub or shower shall be a photo electric type smoke detector".

The newest version of the Ma. Building Code which took effect 1/1/08 requires photoelectric type detectors. A dual sensor detector: (photoelectric sensor and ionization sensor in a single device) may be used for areas greater than 20 feet from a kitchen or full bath.

HOW DO I TELL THE DIFFERENCE:

An ionization detector will have a reference on the detector label to radioactive material. There may also be a "lower case **i**" for ionization or the radioactive symbol. Any reference to radioactive material indicates the detector is ionization type.

A photoelectric detector may have a "capital P" molded into the face of the detector.

DETECTOR REPLACEMENT:

The new Building Code references a newer edition of the National Alarm Code. This code states "detectors are not to remain in service past 10 years". Detectors should have a date code on the label.

For additional safety tips visit: www.chatham-ma.gov and click on the Fire Department page or email comments:fireinspector@chatham-ma.gov

CLICK THE LINKS AND WATCH THE SHORT VIDEOS. THEN CHECK YOUR DETECTORS.