Residential Methane Gas Detector Testing Program

Various household chemicals can have an effect on residential methane detectors and lead to false alarms. To determine the response of common methane detectors to a variety of chemicals, a testing program was conducted to provide accurate information on product performance and sensitivity.

Project Description

Residential gas detectors are small AC-powered plug-in devices intended to detect natural gas (methane) and liquefied petroleum (LP) gas (propane), which may be present in a residential building or, in certain cases, in recreational vehicles.

These devices are intended to sound an alarm at or below 25% of the lower flammable limit of natural gas or LP gas.

The popularity of these devices is increasing, especially since insulation and energy-efficiency standards continue to increase. Many manufacturers of HVAC equipment are now recommending the installation of a flammable gas detector in homes.

Anecdotal evidence suggests that these sensor devices may respond with an unacceptable number of false positives, which can cause unnecessary panic and generate an inappropriate response and, over time, cause consumers to ignore alarms.

Prior to this project, there was limited data about the relative responses these detectors would give to other combustible gases. Relative responses will vary from brand to brand and over the life of the sensor.

In this project, research and testing were conducted with a variety of residential methane sensors to determine their selectivity and response to other hydrocarbon gases from household chemicals potentially present in a residential setting (e.g., hairspray, paint thinner, alcohol, and ammonia).

Deliverable

Information developed in this project was presented in a detailed report that allows users to identify substances that may induce potential false or nuisance alarms in methane and propane detectors.

The report provides product-specific performance data relative to methane, propane, and the chemicals that may cause false positives.

Benefits

The results of this research will allow utility companies to add to their environmental and safety awareness interaction with the public by offering information regarding the safety and reliability of in-home combustible gas detectors. The data will also allow for recommendations to be made about positioning and site placement of devices to reduce the occurrence of false or nuisance alarms.

Technical Concept & Approach

This project included the following research tasks:

- **Survey and Selection of Commercially Available Monitors**

  Research focused on commercially available methane and propane detectors commonly found in the United States.

- **Test Protocol Development**

  The research team identified the gaseous household chemicals that could potentially induce false

Detectors were tested in a specially designed test chamber at Gas Technology Institute facilities.

or nuisance alarms in the selected monitors. This list of included hairspray, paint thinner, alcohol (ethanol and isopropanol), ammonia, gasoline, acetone, a fabric refreshener and odor remover, and other products.

A testing protocol was developed that incorporated the use of a test chamber based on the design of the selected monitors.

- **Laboratory Testing**

  A test chamber was constructed to expose the monitors to various combustible gases and other gaseous household chemicals. Each sensor was exposed to varying concentrations and compositions to determine response factors and response linearity.

Results

An availability survey was conducted in the greater Chicago area and at mail-order companies on the internet.

More that 15 devices were selected for testing.

Testing was conducted on the monitors' responses to the following:

- Propane

- Ethanol

- Acetone

- Ammonia

- Paint Thinner

- Fabric Refreshener

- Hairspray

- Furniture polish

- Bleach and Liquid Detergent

- Tetrafluoroethane

- Bathroom Cleaner

- Room Disinfectant/Deodorant

- Oven Cleaner

- Cyanoacrylate Adhesive

- Home Dry-Cleaning Kit

All detectors under test were checked for zero response when exposed to ordinary room air in the test chamber. Following the zero tests, an appropriate volume of methane was introduced into the chamber by means of a large gas-tight syringe such that the methane concentration should slightly exceed 25% of its LEL in air in order to test that all detectors respond as intended. Chemicals were added individually to the fan-circulated air in the test chamber and the response or lack of a response of the detectors under test was determined.

> ***"I was impressed with the excellent laboratory work in this project. This was a relatively quick-turnaround project and the results were very informative."***
>
> *- Edward Ecock*
> *Department Manager*
> *Con Edison*

Indications are that the methane gas detectors do alarm with some, but not all, of the reactants. One device failed to respond to methane at the 25% LEL (lower explosive limit) in air concentration. This trend continued throughout the testing, although it did respond to other chemicals.

Bleach, bathroom cleanser, oven cleaner, cyanoacrylate adhesive, and home dry-cleaning kits did not give false positives. Hairspray was the only chemical that gave false positives across all brands, although not all of the devices responded.

Status

This project is completed.

A Final Report detailing research and testing results was released to project sponsors in July 2010.

For more information:

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