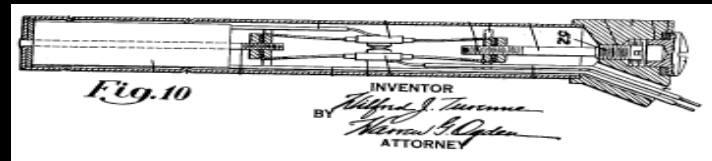


A Comparison of Rate Compensated Heat Detector Test Methods



Overview of Rate Compensated Fire Detectors

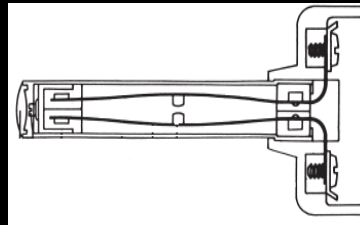
- Thermal switch technology invented by Wilfred J. Turenne in the 1920's



- Have been mass produced as fire detectors since the 1950's



Fenwal heat detector



Thermotech heat detector

- At least 100,000 units sold annually
- Units in operation? - estimated in the millions

Detector function testing and calibration: Regulatory requirements

- Common regulatory agency requirements for United States:



NFPA

Heat test shall be performed annually with a heat source per the manufacturer's recommendations for response within 1 minute. A test method shall be used that is recommended by the manufacturer or other method shall be used that ***will not damage*** the non restorable fixed-temperature element of a combination rate-of-rise/fixed temperature element.



Code of Federal Regulations

All fire- (flame, heat, or smoke) detection systems shall be tested for operation and recalibrated every 3 months provided that testing can be performed in ***a non-destructive manner***. Open flame or devices operating at temperatures which could ignite a methane-air mixture shall not be used.

Detector function testing and calibration: Manufacturer requirements & recommendations

- Test methods: Heat gun, hair dryer, or heat lamp
- “**DO NOT** overshoot the set point of the unit by more than 100°F (55°C), this could result in a shift of the set point temperature.”
- “**DO NOT** contact the sensing shell with heating device such as a soldering iron or blowtorch as this will damage the unit and cause a shift of the set point temperature.”
- “.....units are hermetically sealed and factory set, employing standard aluminum test blocks at the temperatures listed in the datasheet. A test kit with an aluminum block is required as it simulates factory test equipment. Heat transfer mediums such as liquid and air, or test equipment such as air, liquid or sand baths are not recommended and should not be used for testing purposes.”
- Replacement is recommended if the detector is subjected to intense heat- as in a fire

Comparison of testing methods for rate compensated fire detectors:

- Heat gun/hair dryer
 - ✓ Only practical at low heights (most detectors are mounted on ceiling)
 - ✓ Does not provide indication of actual trip point
 - ✓ Power cords must be carried around to each area to be tested
 - ✓ High surface temperature (burn hazard)
 - ✓ High temperature (destructive, will permanently shift set point)

Comparison of testing methods for rate compensated fire detectors (cont.):

- Friction (such as rope wrapped around detector)
 - ✓ Only practical at low heights (most detectors are mounted on ceiling)
 - ✓ Does not provide indication of actual trip point
 - ✓ Damage to shell of detector
- Boiling water
 - ✓ Only practical at low heights (most detectors are mounted on ceiling)
 - ✓ Does not provide indication of actual trip point
 - ✓ Damage to shell of detector
 - ✓ Scalding burn hazard

Comparison of testing methods for rate compensated fire detectors (cont.):

- **Industrial soldering iron** (large iron without tip)
 - ✓ Works in high locations
 - ✓ Can be heated up and used for several minutes before it needs to be plugged in again
 - ✓ Does not provide indication of actual trip point
 - ✓ Temperature of iron exceeds 1000°F
 - ✓ Will cause the sensors set point to permanently shift
 - ✓ Extreme burn hazard
 - ✓ Dangerous ignition source-(detector coated with oil splatter) in vicinity of potential gases
 - ✓ Detector shell is often dented, bent, or otherwise distorted from rough contact with iron. This usually shifts the detector set point high, but goes un-noticed due to the high test temperature of the iron.

Comparison of testing methods for rate compensated fire detectors (cont.):

- **Exothermic** (chemical reaction)
 - ✓ Messy/ inconvenient
 - ✓ Do not work at high temp (over 190°F)
 - ✓ Does not provide indication of detectors actual trip point
 - ✓ Users must constantly buy more chemical
- **Aluminum test block**
 - ✓ Accurate calibration and function checking up to 600°F
 - ✓ Sensitivity test- trip point verified
 - ✓ Bench test unit, sensor must be physically removed for test
 - ✓ Safety risk- Technician must climb ladders or scaffolding to R&R detector
 - ✓ Expensive – Labor to R&R detector, cost of tool, replacement detectors

✓ HST Series heat detector tester

by Skinner Innovations



- ✓ Safe, low surface temperature
- ✓ Non-destructive, controlled test temperature will not damage sensors
- ✓ Test temperatures up to 725°F
- ✓ Portable tool - long life battery - tests sensors in place
- ✓ Simple & easy to use up to 30+ feet overhead
- ✓ Control unit monitors temperature and test progress and provides visual indication of temperature and test progress
- ✓ Sensitivity check- Verifies that sensor trips at temperature no higher than the manufacturers rated trip point