Educational Session

Overview of Recent Activities on Fire Detection and Notification Standards

Scott Lang
Honeywell

Automatic Fire Alarm Association

1

Agenda

- Background
  - Harmonization status
- Changes affecting all standards
- Detection
  - Gas
    - CO Alarms & Detectors
    - Fuel Gas Alarms & Detectors
  - Smoke & Heat
    - Alarms
    - Detectors
- Notification
  - Transition to UL 1638 and New UL 1971
  - Updates to UL 464, UL 1638, UL 1480
  - Strobe requirements

Automatic Fire Alarm Association

2

Recent changes to product standards

- ✓ Changes are being driven (mostly) by harmonization
- ✓ Nearly 25 years of harmonization activity is paying off

Automatic Fire Alarm Association

3

Current Status

UL Standard	ULC Standard	Description	Status
UL 268	ULC 529	Smoke Detectors	Harmonized
UL 217	ULC 531	Smoke Alarms	Harmonized
UL 521	ULC 530	Heat Detectors	Harmonized
UL 539	ULC 589	Heat Alarms	Harmonized
UL 464	ULC 525	Audible Notification	Harmonized
UL 1638	ULC 526	Visual Notification	Harmonized
UL 1480	ULC 541	Fire Speakers	Harmonized
UL 1971	ULC 591	Tactile Signaling Devices	Harmonized
UL 2034	CSA 6.19	CO alarms	In Process
UL 2075	ULC 588	Gas detectors	In Process
UL 1484		Gas alarms	In Process
CAN/UL 2684	CAN/UL 2684	Video/Thermal Image Detectors	Harmonized
CAN/UL 1395	CAN/UL 1395	Transient Test Methods	Harmonized

Automatic Fire Alarm Association

4

Changes across multiple standards

5

ANSI/CAN/UL/ULC 1395:2025

First Edition – December 9, 2024

Scope: These requirements cover the transients test method for fire, security, and life safety equipment. These tests include supply line (ring wave surge voltage) transients, Internally induced Transients, Sequential Arc Transients, Radiated Electromagnetic Fields, Field-Wiring Transients, Surge Immunity Test (Combination Wave), Surge Current Test, and Static Discharge Test.

Goal was to standardize the test across all Fire product standards

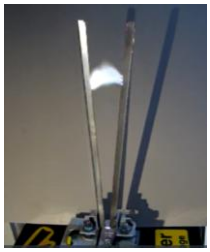
Ultimately, 1395 will be referenced in all other standards.

Automatic Fire Alarm Association

6

1395 Development

- The newly formed TC would focus on moving the test methods and procedures into the new standard.
- The TC would not (initially) question the need for any individual test.
- The sequential arc (Jacob's Ladder) test was a major sticking point.



Automatic Fire Alarm Association

7

Transient Tests Horizontal Standard

- Still have work to do to standardize RF susceptibility frequencies
- Individual standards have to list each frequency
  - 1395 simply has the whole list of all possible frequencies
  - TC 1395 punted on this decision
- Detection and notification TCs are working to standardize
  - 27, 150, 450, 866, 910, 5800 MHz when individual transmitters are used

Automatic Fire Alarm Association

8

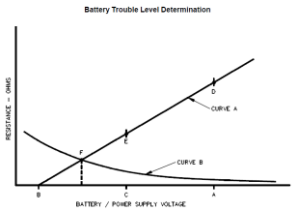
Long term test for lithium batteries

Some fire products (generally wireless) are powered by lithium-metal batteries (non-rechargeable)

Standards were written around alkaline and carbon zinc technology

10-year batteries have to be tested for ten years

- Task Group writing requirements around automated testing of batteries
- Some evidence for correlation between accelerated testing and actual battery life



Automatic Fire Alarm Association

9

Corrosion Test

- Until recently all standards required the ten-day (fish tank) test
  - Test was not repeatable or reproducible
  - Test was not designed for electronics
- Mixed flowing gas test is offered as an option in all standards
  - Gas mixture continuously flows
  - Test specifically designed to accelerate aging of electronics
  - Test takes 21 days

ATC Test Labs

Automatic Fire Alarm Association

10

Non-printed instructions

All non-consumer products now allowed to forgo printed installation instructions.

Manufacturers are allowed to put a bar code on the nameplate that links to the current instructions.

Products like smoke and carbon monoxide alarms still require paper instructions in each box.

Automatic Fire Alarm Association

11

Initiating Device Standards

12

Detection Standards

- Gas
  - CO Alarms (UL 2034)
  - Flammable Gas Alarms (UL 1484)
  - CO & Fuel Gas Detectors (UL 2075)
- Smoke
  - Alarms (UL 217)
  - Detectors (UL 268)
- Heat
  - Alarms (UL 539)
  - Detectors (UL 521)

Automatic Fire Alarm Association

13

- Harmonization project underway for UL 2034 and CSA 6.19
- Project started November 2025
- Changes will be restricted to harmonizing requirements (mostly)
- The key harmonization issue is low level CO display
  - UL 2034 5th edition certified CO alarms may have a display
    - The display may not provide a reading below 30 ppm unless "peak button" pressed
      - This functionality is not described in the standard
      - Many products display "0" even though the reading may be as high as 30 ppm
  - CSA 6.19 allows display of CO concentrations below 30 ppm

Automatic Fire Alarm Association

14

Gas Detection – CO Alarms

- Larger changes will wait until after harmonization
  - Voice
    - Should voice be required?
  - 10-year battery
  - Usability
    - Need more information about how people interact with the device
    - Possible FPRF research area
  - Alarm thresholds!

National Carbon Monoxide Awareness Association

15

Fire Protection Research Foundation report

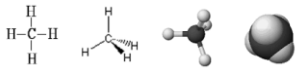
- Assessment of the Association Between Acute CO Exposure, COHb levels, and Health Effects – An Update
  - Report available for free at nfpa.org
- Contractor: R.E.M. Risk Consultants
- Total cost: $25,000
- Key finding:
  - COHb level in individuals exposed to CO does not correlate well to health outcomes

Automatic Fire Alarm Association

16

Fuel Gas Detection

- Explosions due to natural gas leaks are a persistent problem
- NFPA developed NFPA 715 – the standard for fuel gases detection and warning equipment
  - TC is now working on the 3rd edition
- States and local jurisdictions are passing laws requiring the installation of fuel gas detector and alarms
  - No requirements in the model codes yet
- There has been increasing focus on the product standards



Automatic Fire Alarm Association

17

Gas Detection – Flammable Gas Alarms

- Harmonization
  - Currently no Canadian standard!
  - Project underway to create harmonized standard from UL 1484
- Other efforts
  - Discussion over whether standard covers more than fuel gas alarms
  - Standard needs work to add requirements on primary/secondary power
  - Recently alarm threshold changed from 25% LEL to 10% LEL
    - Change was based on FPRF research

Automatic Fire Alarm Association

18

Gas Detection

- All types of gas detectors are covered by UL 2075 and ULC-588
  - CO and Fuel Gas requirements are of most interest
- Harmonization effort began in 2024
  - The two standards were quite different
  - Two preliminary reviews were needed
  - Publication in 2026
  - No new requirements are intended
    - Except Canadian requirements that did not exist in the UL standard

19

Gas Detection – Future Proposals

- Portable CO monitors
  - Power sources?
  - Alert thresholds?
  - Reliability?
- Detectors other than CO and Flammable Gas
  - VOC
  - Electrolyte vapor
- TC 1498 alignment

20

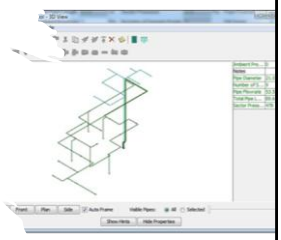
Smoke Alarms

- Smoke alarms: UL 217
  - Mostly cleanup
  - Proposals that were approved for the 9th edition, but left out of the 10th
    - Commercial vehicle alarms
    - Self-test
  - Work is needed for wireless interconnection requirements

21

Smoke Detector

- Smoke Detectors: UL 268
  - 7th to 8th edition: pipe networks for aspirated smoke detectors
  - Further revisions to 8th edition
    - Lithium battery testing
      - Allow manufacturers that use lithium batteries to forgo drawing the battery curve
    - Self-test
      - Requirements are agnostic to the particular method used for self-testing
      - Some detectors claim to be able to perform smoke entry testing per NFPA 72
      - Essentially manufacturers need to prove their claims



Automatic Fire Alarm Association

22

Cooking Nuisance Smoke Test

- Test was originally conceived as a way to prevent smoke detectors from being too sensitive as a result of the new fires
- As implemented, test allows for too much variation
- Added constraints on the test profile are needed
- Has the test achieved its goal of reducing nuisance alarms?

Automatic Fire Alarm Association

23

Heat Detection

- Heat alarms – UL 539
  - Not much development
  - Increased scrutiny on product availability due to requirements for heat detection in residential garages with battery energy storage

Automatic Fire Alarm Association

24

Heat Detection – UL 521

- Harmonization of US and Canadian standards was uneventful
- Added optional requirements if heat detectors are used for FSAE
  - NFPA 72 Section 21.5, Fire Service Access Elevators
  - Annex guidance in A.21.5
    (1) Normal ≤90°F (32°C)
    (2) Monitoring (supervisory) between 90°F (32°C) and 135°F (57°C)
    (3) Unsafe (alarm) above 135°F (57°C)

Automatic Fire Alarm Association

25

Heat Detector Temperature Ranges

- NFPA 72 First Revision to eliminate the wide temperature bands that artificially constrain installation of heat detectors
  - Move to simply require that heat detector set points be at least 20 degrees above ambient temperature

Table 17.6.2.1 Temperature Classification and Color Code for Heat-Sensing Fire Detectors

Temperature Classification	Temperature Rating Range		Maximum Ceiling Temperature		Color Code
	°F	°C	°F	°C	
Low	100–134	38–56	80	28	Uncolored
Ordinary	135–174	57–79	115	47	Uncolored
Intermediate	175–249	80–121	155	69	White
High	250–324	122–162	230	111	Blue
Extra high	325–399	163–204	305	152	Red
Very extra high	400–499	205–259	380	194	Green
Ultra high	500–575	260–302	480	249	Orange

Automatic Fire Alarm Association

26

Video and Thermal Image Fire Detection

- CAN/UL 2684: binational product standard
  - Cover video and thermal image fire detectors
  - Loosely based on UL 268; replaces UL 2688
  - No products are currently certified
  - First Edition – standard will evolve as manufacturers begin to certify
- Thermal imaging has been added to NFPA 72 for 2025
- Thermal imaging is a detection option in the IFC for energy storage

Automatic Fire Alarm Association

27

Notification Standards

- "A" versions of the standards
- Transition to UL 1638 and the new UL 1971
- Updates to UL 464, UL 1638, UL 1480

Automatic Fire Alarm Association

28

"A" Versions

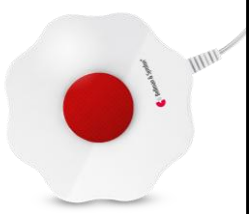
- General signaling appliances
  - UL 464A: Audible
  - UL 1480A: Speakers
  - UL 1638A: Visual
- "A" versions were created when standards were harmonized
- UL standards had non-fire products in their scope; ULC standards did not
- Standards need to be updated to bring them in line with their Fire product standard counterparts

Automatic Fire Alarm Association

29

UL 1971 to UL 1638

- Until recently, all public mode strobes were certified to UL 1971
  - The UL reference in NFPA 72 changed in the 2022 edition
- Private mode and outdoor strobes were listed to UL 1638
- UL 1971 now is used exclusively for tactile signaling appliances
  - Standard was made binational with harmonized requirements
  - Bed shakers and pillow shakers would be listed to this new standard



Automatic Fire Alarm Association

30

Updates to UL 464, UL 1638, UL 1480

- 3 Fire notification standards have many similar requirements
  - Need to update for batteries and reference to UL 1395
- UL 1638
  - Confusing terminology – needs clarification
    - Public vs. Private mode
      - Public has light intensity and light distribution pattern requirements
    - Fire
      - Public mode - Must be clear lens/white light
    - Emergency warning (mass notification)
      - May be colored
      - NFPA 72 requires them to meet public mode requirements
    - Informative textual displays
      - Always private mode

31

Strobe Requirements

- Historically, in UL 1971, strobes were tested at 0 and 49° C
  - Products were tested for light output only pre and post test
- For the harmonized 5th edition of UL 1638
  - Dry, damp, and wet environment categories were added
  - Strobe is tested for light output during the cycling
    - This has caused operational issues with running the test
- Harmonization committee is looking to move back to endurance type tests – no testing at the temperature extremes

32

Summary

- Harmonization has come a long way in just the past 3 years
  - Only a couple of standards left to be harmonized
- Carbon monoxide detection is an active area of development
- Post harmonization, there are a number of key issues that need to be address in both initiating and notification standards

33

Questions

Scott Lang
Honeywell
scott.lang@honeywell.com

AFAA Automatic Fire Alarm Association

34