



New Smoke Alarm Standard with Bruce Johnson from Underwriters Laboratories

- Speaker 1: Welcome to CRR Radio from the Vision 2020 Project.
- Ed Comeau: Hi, my name is Ed Comeau from CCR Radio. Joining us today is Bruce Johnson from Underwriters Laboratories. Thanks for joining us Bruce.
- Bruce Johnson: Good morning Ed. And thank you for invitation to be on the podcast tonight.
- Ed Comeau: Could you give us a little bit of background about yourself? What do you do over there at UL?
- Bruce Johnson: Certainly I'm part of what we call our codes and regulatory services team. UL provides our team with a unique opportunity to share our subject matter expertise in the arena of building and fire safety codes. We work with model organizations like ICC and NFPA, particularly with new and innovative technologies, tying the research that UL does and the innovation and technology into actually model code requirements and safety standard testing. That certainly ties into UL's mission of working for a safer world. That's how I got involved with what we'll talk about today, which is the safety standards for smoke alarms and smoke detectors.
- Ed Comeau: Great. And that falls under what they call UL 217, the UL standard 217. Can you tell the listeners a little bit about what that is and who's on the committee and that sort of thing?
- Bruce Johnson: Certainly Ed. UL 217 is a standard for smoke alarms and that standard really focuses on devices that are primarily used in one and two family homes or townhouses. They are an integral device that includes both a sensing technology and also a sounder. They could be interconnected, they could be AC powered or battery powered. The key part there is that in a single unit you have both the sensing technology and the alarm feature. And that's a little different than a smoke detector, which is listed to a similar standard. It's called UL 268. That's where we have devices that are initiating devices typically connected to a fire alarm panel and then there's separate enunciation devices like horn strobes. Those devices are typically low voltage AC powered and the key there is that they're connected to a fire alarm panel.
- Bruce Johnson: We do try to be very specific in the differentiation between smoke alarms and smoke detectors. We'll focus on smoke alarms today.
- Ed Comeau: And who's on the UL 217 committee? What's the makeup like?



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Bruce Johnson: Great question Ed. So UL 217 is a ANSI consensus process standard, it's been around since the early 1970s. It's gone through several revisions. And what UL has for all of our consensus standards is what we call a Standards Technical Panel or STP. That is up of volunteer or subject matter experts from a number of different categories that are actually responsible to review through a formal process any suggested changes or amendments or additions to a standard.

So in this case, the 217 STP, or standards technical panel, is looking at any proposals that are made to change that standard. Proposals or recommendations can be made by any individual. Then in that public process, the standards technical panel actually reviews those and ultimately has to vote in what we call reach consensus. For a UL STP consensus is 80% agreement with the change for it to actually become part of the standard.

So for the STP for 217 we have a really good mixed group. And again, it's a balance committee. So we have seven authorities having jurisdiction. We have two consumer, we have 11 general members. We have two governmental members. We have 10 in what we call our producer category. We have two in supply chain and then we have four that are part of testing or standards organizations. I like to point out here Ed, that UL has one of those four voting positions in the STP from the category of testing and standards organizations and other nationally recognized labs fill those other three spots.

One of the challenges that we come across, and this will relate to the timeframe that it took to get some of the changes through this consensus process and to update the 217 standard, the consensus process sometimes takes a while getting through comments, getting through and actually reaching consensus at 80% can be a time consuming process. Folks think that if it's a UL standard that UL can simply make the changes and do that in a very quick fashion. But the reality is that we only have one seat on that committee and we have to provide research and data to support any changes that ultimately get made.

So that's why sometimes these things through a consensus process do seem to take longer than one might normally expect. But I think the consensus process really means that we get a lot of expertise into the decision making. The language is well vetted and at the end of the process we have a much better safety standards.

Ed Comeau: So then what role does 217 play in the marketplace or to a manufacturer? Is it a standard that they have to then design to?



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Yes. The 217 standard is actually a requirement in all of the national model building and fire codes and life safety codes. So that sort of triggers the requirement where smoke alarms must be installed. And those codes will also get into some of the nuances about what you do with existing buildings and residences and having a requirements for replacing smoke alarms when they actually reach their useful life or end of useful life, which is generally 10 years. So those requirements are all starting from the model codes. And then the standard is actually that safety yardstick that all the manufacturers have to submit their product to be listed or certified. And that's a very vigorous standard. We can get into some of the details, but it's very specific.

The challenge with any safety standard when you're doing evaluation for pass fail is the big challenge to create a test that is reliable and repeatable and really technology agnostic. So the attempt that UL does with our safety standards, including 217, is to make sure that whether that testing is done at UL, and it can be done at different UL laboratories around the globe, it can be done by other nationally recognized or accredited testing laboratories in the United States or across the globe. We want to make sure that the standard is clear enough and has enough precision in that pass fail so that the test is going to have the same results if a manufacturer submits a smoke alarm to UL or to another nationally recognized testing lab and it doesn't matter which engineer is overseeing that test. Again, the results should be consistent and the same.

So that's why there's so much detail in the testing methods and the prescriptive way that that has to be conducted in how we evaluate and get the pass fail.

Ed Comeau: And one of the things you mentioned too, it's independent of the technology. It doesn't matter whether it's photoelectric ionization or any new technology that may come out. You're looking at how it performs, is that correct?

Bruce Johnson: Yes. That's really the basis for the pass fail criteria. And being technology agnostic, that does leave the door open for new and innovative technologies that can pass that test. And in this case for smoke alarms, the very basic part is to make sure that the alarm is going to send smoke in the right timeframe so that it allows enough time after it alerts for people to actually escape or exit their home. And it needs to have some fail safe criteria. It obviously has to not create a fire hazard, not create an electrical shock hazard. And as we get into some of the new features Ed, one of the things that we really focused on was to make sure if there are other added features, wireless or Bluetooth or connection to other devices that the basic function of the smoke alarm would always remain and not be distracted by other features or technologies. Still being able to detect smoke and alert is the primary focus or function of a smoke



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alarm and that's the performance level that we want to assure is always there during the useful life of that smoke alarm.

Ed Comeau: So let's dive into the changes. What is new? What came out of the new 217?

Bruce Johnson: Well probably the biggest change is addressing what was a very known problem of nuisance alarms, which led people to disable their smoke alarms, either removing them entirely or removing the battery. So if we think about where we were several years ago, NFTA did a study and we have a reference to that study that we can provide to this group through a micro site that UL has. But it was the smoke alarm problem and fires that were occurring that had fire fatalities or injuries, the difference reports were showing that a lot of those fires, there was smoke detectors present, but they were disabled or they didn't function for some reason. And NFTA Research Foundation did a study and by far the biggest contributing factor to disabling a smoke alarm was cooking nuisance smoke.

So that was one of the big things that we were able to take a look at and say, well what can technology do to help address that problem? So at that point, UL and NIST and the and NFTA Research Foundation started looking at what can we do to better identify the different types of smoke and be able to discriminate between what would be cooking emissions, basically a non hostile type smoke that was causing smoke alarms to activate, but also have sensing technology that would allow the smoke alarm to detect hostile or dangerous smoke quick enough so that it was matching up with the escape time.

So that led to what we call a smoke characterization study Ed. And this was really interesting and very scientific. We do provide a link and you can actually read the report. But that really started to focus on how can we identify the different types smoke from a variety of different types of fires. And the study actually looked at over 50 different types of sources of smoke, from different cooking sources, looking at smoldering fires, looking at fast flaming fires and how can we create a test that would reduce nuisance alarms, but at the same time activate quick enough when we had a dangerous fire that required people to act quickly.

So that was kind of the starting point for initiating changes. That information was actually presented to the STP a number of years ago for 217 and they decided to create a task force to really dive into the ability to create some tests that would really take us to the next level with smoke alarms so that we could meet those two goals, acting fast enough for the current fire environment and greatly reduce the nuisance alarms. And I think the readers will also be interested to know that the statistics that are showing that you have 15 or 20



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years ago based on the type of furnishings that we had in homes, escape time could be as much as 17 minutes. Fires weren't going to flash over nearly as quickly. You didn't have the toxic smoke being produced by the synthetic materials that are much more common in the home today. So that has also led to escape time that is probably around three minutes. So from 17 minutes to three minutes, that's a significant change and that's not a lot of time to escape.

The other challenge that we had is being able to have that smoke alarm recognize that hostile smoke and activate quick enough to allow adequate escape time. That's really what led to one of the most significant changes in the 217, creating some new tests.

Ed Comeau: What are some of these new tests?

Bruce Johnson: So one of the tests is the nuisance reduction test. I'll throw in a little plug to a UL's smoke alarm micro site here. Very simple to find, just type in your browser smoke alarms with an S, .ul.com, smokealarms.ul.com. We've got a lot of new information about where we are with the smoke alarms. The first page is kind of an easy read. It's good for public educators or consumers. And then we've got some links to get into so much more technical information, like the smoke characterization report or some of the testing that is actually now required with the new 217 standard. And we've a nice video that shows our new smoke alarm lab in Northbrook that is where we're testing these new smoke alarms. One of the tests that we do is we actually cook hamburgers. We've got a nice video showing how we're cooking hamburgers and actually testing smoke alarms so that they are not activating if we have what was normal missions off of cooking hamburgers to make sure that they are truly nuisance reduction type of smoke alarm technology.

As an interesting sidebar when we talk about a reliable and repeatable test. One of the things that we had to specify, and this again went through the STP, is all right, how are we going to cook hamburgers? So what kind of pan do they go on? What type of meat do we use? What's the fat concentration? what temperature do we use? And that doesn't sound really important, but if we want to have a reliable and repeatable test, that level of detail is really critical. And the time that you burn and you know what the pass fail criteria are so we have that consistent result really becomes critical. So that's on the one end of preventing the nuisance alarms.

And then we do two types of polyurethane foam testing. We do one related to a fast flaming fire, which is a quick ignition. And then one for a smoldering polyurethane foam fire. And that kind of brings us back to the older technology



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and the concerns that we had about two different technologies, photoelectric and ionization. In the past, we were looking at ionization as being really good for a fast flaming fire. Photoelectric being better for a smoldering fire. And there was some recommendations out there to have a dual sensor type of smoke alarm. That also sets up the stage for where we are with how these new smoke alarms are passing all three of these tests basically, the flaming, the smoldering in the nuisance reduction. They're using multisensory as we call it, multi criteria. And I think that's something that the industry will be promoting and the audience will hear a lot more.

We won't be hearing about photo electric or ionization after May of next year, which is the effective date for the new standard. And I'll talk more about that. But we won't be hearing about those specific technologies. We're going to be hearing more about multi criteria. That's going to include some sensing criteria and also some logic in a chip that is actually going to be able to take information from those different sensors run an algorithm, a logic algorithm, and be able to then distinguish that non-hostile smoke like cooking smoke from the dangerous smoke and then either activate or not activate accordingly.

So we're seeing, and the other term that you might hear as a smart smoke alarm because it has the algorithm shift, but smart smoke alarms, multi criteria, those are going to be some of the things that you hear going forward. And you're going to hear much less about ionization or photoelectric.

Ed Comeau: So you mentioned the effective date. When does all of this take effect?

Bruce Johnson: So the date that's been established is going to be May of 2020, almost a year from now. And the reason that we had to extend that date, the standard has been published and available. I can share that we have a number of manufacturers that are actually actively doing their R&D and they're testing their products with UL in our smoke alarm lab. We have one smoke detector, which is a UL 268, a low voltage a device that has already been listed to the latest edition of UL 268.

But what we're seeing now is manufacturers are testing different criteria that's still somewhat in that, we'll call it R&D and certification mode. So we're seeing a lot of activity in our smoke alarm lab. And we're anticipating that probably by this summer we're going to start to see product that is going to hit the market that will meet the new testing criteria. But the actual last date to test to the current standards is going to be May of 2020. After that, everyone will have to meet the new standards. You'll see on our website that we've actually identified, there will be a enhanced UL mark if the listing is actually coming from



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UL. Other labs may be doing something similar, but we're going to have an enhanced mark that identifies this product and it will say helps reduce nuisance cooking alarms. So that phraseology is something that the consumer or anybody that is approving smoke alarms for installation should be looking for certainly after May of 2020. And we the labeling Ed, which is always required, will be on the actual smoke alarms. So you'll see that and you'll see the helps reduce nuisance cooking alarm.

And then we'll also allow that same wording to be on the packaging. So when you're looking for smoke alarms, if you purchasing them in the retail market, you'll be able to quickly identify the alarms that are tested to the new standards.

Ed Comeau: So what happens with the local AHJ? For example, I live in Massachusetts. Does that mean that I have to change out all my smoke alarms or is it just if I, going forward, if I replaced a smoke alarm, it has to be to the new standard?

Bruce Johnson: Great question Ed. I think one of the important messages here is that that's tested today that's been installed recently, those alarms are still safe. They are performing to the minimum standard that was in effect when they were installed. And the consumer should, and the AHJ, should have confidence that they are still safe devices. All of the alarms that are installed today have a manufactured date. It's recommended in the manufacturer's instructions and required through some of the model codes that those smoke alarms be replaced when they hit 10 years. So if you have an alarm and you have several years left before you hit that end of life, it's perfectly safe to keep that alarm in your home. And when it comes time to replace the alarm, obviously you'll see new product in the marketplace. And it will be a really neat product because it's going to help reduce the nuisance cooking alarms. And then there's a lot of manufacturers out there that have some really neat extra features and technologies that the consumers may be interested in. If you have an older home and all your smoke alarms are not interconnected, the technology will be there to have wireless interconnection.

I think interconnection is really important because if we have larger homes, you have bedrooms on the second floor and you have a fire that actually starts on the first floor, if it's a single station smoke alarm, it's only activating where the fire is occurring. And that's far away from where people are sleeping. It may be difficult to hear that alarm. The interconnected alarms, when one has an activation for a smoke condition, it's going to sound in all the alarms and alert people throughout the home. So even having a wireless interconnection is a great improvement in safety. There may be many other types of Bluetooth



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features or into connectivity that these new smart smoke alarms are going to have. Maybe sending a signal to your smartphone. All of those things are going to be under the umbrella of the new 217 standard in May of next year. All tested to perform the way the manufacturer is promoting them. But most importantly still functioning as that smoke alarm and providing you that level of safety.

Ed Comeau: You bring up a question that I've always really kind of wondered about and haven't got an answer on. If you live in a place that requires hardwired, interconnected smoke alarms, would that are wireless take care of that interconnectivity requirement? It's not hardwired, but it's still interconnected.

Bruce Johnson: Well, there's two questions there Ed that I'd like to address. The first one, and I learned this when I came to work at UL four years ago, even being able to interchange a smoke alarms with different manufacturers, even the current ones that out there that are interconnected, the challenge is that each manufacturer uses some different technologies and believe it or not, there's even some software that in a hardwired interconnected smoke alarm today actually is that sounding in all the devices when the alarm goes off. So interchanging, even manufacturers, sometimes there's an inconsistency there. So most of the time you have to stay with one manufacturer to to have those devices actually work.

The second part of that question, and this is going to be a challenge for AHJs as the new product actually hits the marketplace. A lot of states have adopted specific requirements related to the ionization or photoelectric technologies. where you might install them. We see a lot of legislation that talks about not installing ionization type smoke sensing technology near kitchens, cooking appliances or bathrooms. They spell out specifically photoelectric. And as I mentioned, those technologies are really not going to be in the marketplace the way they were a few years ago after we hit the May 2020 date. So we're going to have some challenges possibly with repealing state laws because their products that they require are no longer going to be commercially available. And that also relates to the hardwired. It could also relate to the power source. Some of these new smoke alarms depending on how many extra features you have, they may not be capable of lasting the 10 years with a single source seal type battery. There's going to need to be an examination and maybe some changes to state laws to address the new technologies that will be in the marketplace.

Ed Comeau: Interesting times ahead of us then. We'll have to see what comes down the road.



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We've been talking with Bruce Johnson from Underwriters Laboratory about the changes that are happening in smoke alarms from the UL 217 standard. Bruce, I'll be sure to include a link to your website you mentioned in the show notes here so people can go there and get a lot more information. I really appreciate you joining us today on CRR Radio.

Bruce Johnson: Thank you Ed. Appreciate the opportunity.

Ed Comeau: CCR Radio is a production of the Vision 2020 Project. It is edited by Rich Palmer. My name is Ed Comeau and be sure to subscribe to CCR Radio and download all our past podcasts. You can find it at Apple iTunes, or I guess it's Apple Podcasts now. And you can also find it on our website at www.strategicfire.org/crrradio. And we'll see you next time here on CCR Radio. Thanks a lot.

Speaker 1: Thanks for joining us on CRR Radio from the Vision 2020 Project. For more information on community risk reduction, please visit us at www.strategicfire.org.