

A case of double standards...

... EN54 verses NFPA / UL ...

... by Mike Troiano of AFS Inc.

Mike Troiano, President of Advanced Fire Systems Inc., describes the differences and synergies between US & European fire systems and gives examples of future convergence.

Companies, whose main goal is to engineer and develop fire detection systems for application in the world's global markets, have a major, almost insurmountable task on their hands. One of the most significant challenges they face is the differences in fire codes and standards. Despite attempts that have been ongoing for over a hundred years to agree on common fire codes and standards, the end is still not in sight. Not only are there differences continent to continent and region to region, but in Europe there are differences in requirements from country to country and in the US state to state and even in some instances city to city.

To make matters more complicated, fire codes and standards effect: 1) the way the products themselves are designed and how they must perform, 2) the way that the system shall be installed, effecting for example the wire types, locations of smoke detectors and spacing of sounder and strobe devices, 3) how a system is operated once installed, and by whom, 4) how and when a system shall be serviced and maintained over time, 5) the manner in which fire departments and fire brigades are notified and ultimately respond to the report of a fire and 6) the operating language - as the world speaks more than just English!



EN54 versus UL '864'



UL89 9th Edition (America) AX 'V' Series Integrated Fire & Audio panel



EN54 (Germany) Penta Control Panel

Two major standards dominate the world market; the US National Fire Protection Association (NFPA) and European (EN54). Both standards have the best interests of fire detection, fire prevention, building and life safety at heart and have committees made up of leading fire authorities and experts constantly searching for and seeking to improve the way that fire systems perform.

In Europe, despite adopting the EN54 standards, each country has their own unique requirements. For example, in Sweden and Germany, you can't have a system installed there without a common user interface that includes a "Fireman's Key," which enables control. The principle here is that they don't want their fire fighters having to learn every nuance about every fire system sold in their country, so all systems sold in Sweden and Germany must have common style interfaces designed to a specific standard for use by the fire fighters.

Voice Evacuation Systems and Fire Fighter Telephone Communication Systems, although in common use in the USA, are not widely in use in the EU today. Voice Evacuation might be seen in large sports stadiums, but not typically in other commercial, industrial and residential applications.

Fire Fighter Telephone Communication Systems remain in use today in many of the US states, although in some states there is a trend toward replacement with high end, radio communications systems.

It is very common in the USA to have the status of a fire system transmitted over phone lines, or more recently the internet, via a stand alone or integrated Digital Alarm Communicator Transmitter (DACT) to 3rd party Central Stations. These stations monitor 24 hours per day, and have the responsibility to contact the fire department in case of emergency, along with the property owner and service company. In Europe the use of DACTs is much less prevalent and it is common in certain countries to have alarm communications direct to a municipal station or fire brigade via hard wired routing equipment.

In some USA states, it is common to see a requirement for a City Box interface. City Boxes came into existence in the late 1800s and although mechanical wheels have been replaced with electronics, the principles remain the same. Basically a system going into alarm transmits a signal over a pair of wires that run directly from the facility to the City Box, then onto the fire municipality or fire station.

When comparing two fire panels that have been designed toward complying with the NFPA versus the EN54 standards, they are quite dissimilar. When comparing two fire panels designed toward either standard for use in one country or region of countries to one another, they are often quite dissimilar. Further yet, if one were to compare



US Pull Station



EN Sounder Beacon



EN Manual Call Point



US Horn / Strobe

one manufacturer's fire panel to a competitor's fire panel in the same market, once again one will find sharp disparities. There is no truth to the statements: "a fire panel is a fire panel" or "all fire panels are the same." In fact nothing could be further from the truth.

It would be impossible in such a short article to summarize all the many differences and similarities, but below is a summary of some of the major issues:

USA versus EU - Major differences

AC/Mains Operating Voltage:

The USA is in the minority compared with the rest of the world in that its primary supplied voltage is nominally 120 Volts, 60 Hertz. The majority of the world is 230 Volts, 50 Hertz. However in all cases the AC/Mains voltage supplied in the various countries fluctuates plus or minus some percentage of nominal. In addition, the power supplied is not always "clean" and must be filtered by the fire system or else power line "glitches" can cause false alarms and other problems.

Wiring Types: The quality and variety of the different types of fire system cabling allowed by the various regional standards is surprising. Wires may be thick or thin, shielded or not, mineral insulated, highly capacitive, have various levels of fire protective ratings and current carrying capacity, etc. However in all cases wires carrying high voltages and currents versus those carrying any low voltage communications signals must be separated with the separation distances specified, and the circuits the wires connect to require different levels of safety protection.

Message Terminology

Examples: Alarms vs. Fires, Troubles vs. Faults, Supervisory vs. N/A, AM-PM vs. 24 hour clock, Fahrenheit vs. Celsius. In the USA, when a detector goes into alarm or a pull station is activated, it is viewed and reported as an Alarm. In Europe and other parts of the world, this same condition is viewed and reported as a Fire. If there is a problem in a fire system such as from a dirty smoke detector, a broken wire or a low battery for instance, USA fire systems view and report this as a Trouble Condition, whereas others see this as a Fault in the system. NFPA Codes and Standards recognize problems with a monitored Sprinkler system as a Supervisory Condition and so is treated uniquely different than other trouble conditions, whereas EN54 has no such separate recognition/distinction.

In the USA, systems time stamp events using a 12 hour clock with AM and PM designations, whereas Europe uses a 24 hour clock, so for example 2:00 PM is 14:00 hours. It is common throughout the EU and much of the world to measure temperature in degrees Celsius where the USA measures in Fahrenheit.

User Display: Both US and European systems prioritize Alarms (Fires) but present the information in different ways. For example if multiple fire

alarm conditions are reported, which gets displayed, the first or most recent event? Is the system allowed to scroll the messages automatically or manually? Is the total number of devices or zones in alarm displayed? Must the display show the type of device in alarm, etc., etc., the standards are quite prescriptive and diverse in all of these areas. Also there is a great deal of dissimilarity between what must be displayed when there is a mixture of alarms (fires), troubles (faults), supervisorics,



Virtual Panel Display showing Loop with on board meter

and non fire events occurring at the same time. Finally, while still complying with the required standard, the equipment must support and display the information in the language required by the installation.

Switches/Buttons: Reset, Silence vs. Silence/Resound, Acknowledge, Mute, Fire Drill and Evacuate. The requirements for what happens in a fire system when a Reset switch is pressed varies country to country and

even city to city, especially if the system is installed in a high rise facility. For example in New York City, a reset switch cannot interfere with air handling systems. The Silence/Resound button on an EN54 system allows alternate presses to Silence or Resound sounding and/or strobe devices, but typically, only the Silence function is presented on a USA based system. Other switches of distinction are: Acknowledge (USA), Mute (EU), Fire Drill (USA) and Evacuate (EU).

Loop Power Technology:

In the EU, it is common to have a fire alarm system contain on the same pair of wires: smoke detectors, call points (pull stations), input/output modules, strobes and sounder devices. All of these devices receive their power and communication control signals over the same pair of wires. Due to

the combination of their low operating currents, installation and operations standards, as well as safety standards, such a design has large ramifications in the reduction of power consumption, backup battery requirements, wiring costs and labor costs. Loop power technology has not yet been fully embraced by the USA, but certain forward thinking US manufacturers of Fire detection equipment (such as Advanced) are well on their way to bringing this technology to the US Market.

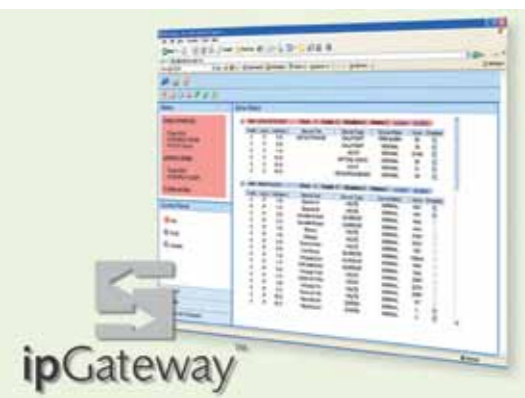
EU Country Differences:

While the EN54 Harmonized Standards are accepted by the EU member countries, it is important to note that each country has an "options with requirements" exception to the EN54 standards that must be adhered to. No two country requirements are the same, with France standing out as the most drastically different from the others in that they require the system power supplies and system wiring to be supported completely separate in a self contained enclosure from the User Interface - key switches and display.

USA Regional, State and City Differences:

Some examples of different requirements across the USA include the following areas: Fire Department Communications - City Box, Radio Transmissions, DACTs and Mesh Networks. Hi and Low Rise applications - Smoke Control Systems, Elevator Controls, Fan and Damper Controls, Automatic and Manual Voice Evacuation, Fire Fighter Telephones. Non Fire interfaces to - Facilities Management Systems, Graphics Annunciation, Video Monitoring systems, Nurse Call systems, etc.

ADA: In the USA, a law was passed in 1990 called the "Americans with Disabilities Act" and it affected fire systems such as requiring the synchronization of strobe lights and their luminous intensity levels as well as affecting the sound levels of sounding appliances measured in dB (decibels). In Europe, there are equivalents (i.e. DDA - Disabilities Discrimination



Advanced ip Gateway for remote fire system monitoring

Act in the UK) standard with the same intentions in mind, but there are differences including the sound levels, spacing of devices, luminous intensity levels, etc., and how these levels are measured by 3rd party approvals agencies is different. Such differences have a major impact on the fire panel and system design due to the extreme differences in the voltages and currents, the backup battery size, system wiring, and programming options.

Advanced Technology is Universal - regardless of the country, city or town and regardless of the national and local fire codes, smarter global manufacturers are applying advanced technology and global experience to the best benefit possible.

For example, the better systems provide peer to peer network topology and deliver high speed performance regardless of the number of panels or nodes on the network. That means that when a switch is pressed to perform a life safety function, it always responds as it should, regardless of network traffic or conditions present on the system. The same goes for

any message that has to be displayed or the fast response to a fire or life safety condition. The networked user displays on these systems are capable of viewing an entire system and can be customized to suit the application.

Smarter systems include built-in intelligent voltage and ammeters which allow technicians to assess the voltages and currents on any wires in the system, 24/7, regardless of the state of the system. These meters can be turned on either at a control panel, or from a remote location.

IP Technology is becoming more prevalent through the use of secure IP Gateway technology, such that systems may be monitored locally and/or remotely as well as providing Email and text message alerts. Quite often not only does this allow the maintenance company to provide enhanced service support to their installed base of systems, but facility managers may be given remote access to the system in order to give them piece of mind that their system is performing properly every second, minute and hour of every day.

Mike concluded that by applying their expertise of global standards, local market requirements and technology the Advanced group of companies have brought together a truly advanced range of fire and life safety products which go together to provide systems which meet and exceed the various market requirements not just in the US and Europe but also across the globe.

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