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Which circuit should I choose? -- Part 1

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I have studied Table 3-5 from NFPA 72-1996, *National Fire Alarm Code.* How do I decide which Class or Style of circuit I should specify for new a fire alarm system in my building?

Over the course of the last two issues of this magazine, I explained the history of the circuit loadings that the Technical Committee writing the requirements contained in this Chapter of the *National Fire Alarm Code* had formerly included. With those circuit loadings gone, your job becomes somewhat more difficult. The variable circuit loadings set each of the Styles of initiating device circuits equal. At the same time, the circuit loadings recognized that those circuits with greater circuit performance could have a greater number of initiating devices connected. Lacking the convenience of comparing the circuits by comparing the circuit loadings, you now must stick to comparing the performance of each Style of circuit.

In Section 3-4.5.1, the *Code* indicates: “The class or style of signaling paths (circuits) shall be determined from an evaluation based on the path performance detailed in this code and on engineering judgment.” This last phrase always evokes an interesting response from readers: “What in the world is engineering judgment?”

Jokingly we often say that at some point during their junior year in engineering school, engineering students wake up one morning and suddenly discover that they have acquired "engineering judgment" If only it were that simple.

One esteemed engineering professor has noted that "Only through a long, painful series of trials and errors, where the neophyte engineer tries first this design and then that, can an engineer achieve sufficient experience to develop proper judgement." If that is so, then the creation of poor designs would seem a natural requirement for all engineers. Poor designs will turn the engineer "back to the drawing board" only to produce yet another design. Finally, at some distant point in the future, the engineer will acquire sufficient experience to give him or her proper judgment.

The danger from such a development process for fire alarm systems comes from the fact that people's lives and their properties are at stake. Fire can all too easily destroy those lives and properties, while some engineer casts about trying to develop engineering judgment.

To aid designers in their quest to choose the most appropriate circuit Style, the *Code* offers the requirements of Section

> 3-4.5.2: Where determining the integrity and reliability of the interconnecting signaling paths (circuits) installed within the protected premises, the following influences shall be considered:
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> (a) The transmission media utilized;
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> (b) The length of the circuit conductors;
>
> (c) The total building area covered by and the quantity of initiating devices and notification appliances connected to a single circuit;

(d) The nature of the hazard present within the protected premises;

(e) The functional requirements of the system necessary to provide the level of protection required from the system;

(f) The size and nature of the population of the protected premises."

So, in order to choose the fire alarm initiating device circuit that will serve your building most effectively, you must first understand the nature and character of each of the five circuits. You must determine from Table 3-5, that a Style A circuit will initiate a fire alarm signal when a wire-to-wire short occurs. It will initiate a trouble signal when a single open fault or single ground fault occurs. And, it will not provide full capability for receiving a fire alarm signal when either a single open fault or single ground fault occurs.

The Style B circuit will initiate a fire alarm signal when a wire-to-wire short occurs. It will initiate a trouble signal when a single open fault or single ground fault occurs. It will not provide full capability for receiving a fire alarm signal when a single open fault occurs. But, it will provide full capability for receiving a fire alarm signal when a single ground fault occurs.

The Style C circuit will not initiate a fire alarm signal when a wire-to-wire short occurs. It will initiate a trouble signal when a single open fault, single ground fault, wire-to-wire short, or loss of carrier channel interface (if used) occurs. It will not provide full capability for receiving a fire alarm signal when a single open fault occurs. But, it will provide full capability for receiving a fire alarm signal when a single ground fault occurs.

A Style D circuit will initiate a fire alarm signal when a wire-to-wire short occurs. It will initiate a trouble signal when a single open fault or single ground occurs. And, it will provide full capability for receiving a fire alarm signal when a single open fault or single ground fault occurs.

A Style E circuit will not initiate a fire alarm signal when a wire-to-wire short occurs. It will initiate a trouble signal when a single open fault, single ground fault, wire-to-wire short, or loss of carrier channel interface (if used) occurs. And, it will provide full capability for receiving a fire alarm signal when a single open fault or single ground fault occurs.

In the next issue, I will further expand the thought process you can use to choose the fire alarm system initiating device circuit that will best serve your building.

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