Coffee Break Training - Fire Protection Series

Fire Alarms and Detection: Secondary Power Calculations

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Learning Objective: *The student shall be able to identify the requirements for secondary power for fire alarm systems.*

National Fire Protection Association (NFPA) 72®, *National Fire Alarm and Signaling Code®*, requires all fire alarm systems to have primary and secondary power supplies. The source of these supplies is left to the installer with the code official's approval.

This fire alarm control panel employs batteries to provide its secondary power source.

If a fire alarm system loses primary power, it must automatically transfer to secondary power within 30 seconds without losing any signals. The secondary power supply must be capable of powering the system in standby ("normal") mode for at least 24 hours and, after that, in alarm mode for at least 5 minutes. Voice command systems require power to operate the system for 15 minutes at maximum connected load. The installer must submit calculations to confirm that the secondary power supply is capable of meeting these demands.

The battery capacity needed to power the system while on battery power is expressed in ampere-hours (Ah) (coulomb (C)). It is determined by computing the number of amperes required, multiplied by the time (in hours) the batteries will be used.

Almost every device connected to the fire alarm system will draw a small amount of electrical current while it is in its "normal" or quiescent mode: ready to detect a fire. The total current draw for all of the connected devices is summed and then multiplied by 24 hours. For example, if the total standby current load is 0.34562 amperes (A) (1,244.2 C), that number is multiplied by 24 to total 8.29488 Ah (29,860.8 C). Then, if the current draw during an alarm is .375 A (1,350 C) (for 5 minutes (one-twelfth hour), that number is added, resulting in a total standby power demand of 8.66988 Ah (31,210.8 C). Some installers will include a safety margin to anticipate battery deterioration or changes to their original plans. Battery manufacturers normally rate their products in ampere-hours at a specific rate, so a 10 or 12 Ah (36,000 or 43,200 C) battery would be appropriate in this case.

Correct battery calculations are crucial, and excess capacity may be important, because the field modification of adding devices may affect secondary power demands. Visual and some audible notification devices may have large power demands that can quickly drain a battery's power supply if the demand has not been factored into the system.

For additional information, refer to NFPA 72®, *National Fire Alarm and Signaling Code®*.