Fire Alarm Wiring

TECHNICAL BULLETIN
FIRE-9-4

City of San Diego
Development Services Department

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The purpose of this Technical Bulletin is to provide fire alarm system wiring guidelines and requirements to the permit applicant. In addition to the information provided in this Technical Bulletin, the permit applicant shall follow definitions, guidelines and requirements from Information Bulletin 137, California Fire Code (CFC) , National Fire Protection Association (NFPA) 72, and the California Electrical Code (CEC), regardless if the fire alarm system is required, optional or voluntary.

I. HIGH-RISE BUILDINGS

The following requirements are applicable to high-rise buildings.

A. When Required

New fire alarm installations in new high-rise buildings, as defined in the California Building Code (CBC), require Class A or Class X circuits to be installed between multiple-control units. New fire alarm systems in existing high-rise buildings, as defined in the CBC, do not require Class A (or X) circuits per California State Fire Marshal (CSFM) Title 24 Code Interpretation #14-006, July 29, 2014. Wiring between control units shall be in continuous metallic raceways or raceways encased in not less than 2 inches of concrete.

B. Class "A" and Class "X" Routing Requirements

Where required, Class A and Class X circuits using physical conductors shall be installed such that the outgoing and return conductors, exiting from and returning to the control unit, are routed separately. The outgoing and return (redundant) circuit conductors shall be permitted in the same cable assembly (i.e. multi-conductor cable, not including ROMEX), enclosure, or raceway only under the following conditions, as described in NFPA 72, Chapter 12.

1. For a distance not to exceed 10 feet where the outgoing and return conductors enter or exit the control unit enclosures.

2. Where vertically run conductors are contained in a two-hour rated cable assembly, or are enclosed (installed) in two-hour rated construction, or the conductors are a listed circuit integrity (C.I.) cable with a 2-hour or greater fire resistance rating.

II. SURVIVABILITY

The following requirements are applicable when survivability is required for the fire alarm system.

A. When Required

1. New fire alarm installations in new high rise buildings, as defined in the CBC.

2. Fire alarm systems employing zoned evacuation or partial.

3. Fire alarm systems proposed to be installed in existing high rise buildings, as defined in the CBC, are not required to meet all survivability requirements in NFPA 72. However, compliance with NFPA 72, Chapter 24 must be provided for all buildings using partial or zoned evacuation.

B. Wiring Methods

The following methods meet the survivability requirements in NFPA 72.

1. Two-hour cable systems with a UL 1724 listing for Electrical Circuit Protective Systems. These cable systems employ protective materials such as intumescent wraps/coatings,

tapes, composite mats, etc., that meet the testing requirements under UL 1724.

2. Circuit pathways in rooms/areas constructed with two-hour fire rated enclosures. Areas constructed with a two-hour fire rating or running through existing rooms/areas with a two-hour rating will be subject to additional review and approval. It is not acceptable to run circuit pathways in exit stairways to achieve pathway survivability.

3. Cable systems running in two-hour rated raceways, including but not limited to, the following:

a. Cable systems embedded in 2-inches of concrete,

b. Cable systems pulled through concrete ductbanks (openings at entrance to and exit from ductbanks must be firestopped),

c. Continuous metallic raceways (conduit, associated compression fittings, and set screw couplings must be two-hour rated and listed), or

d. A CI (Circuit integrity) cable assembly is permitted provided that it has a marking from Underwriters Laboratory (UL) indicating that it is listed to UL 2196 for two-hour survivability rated cable.

4. Performance alternatives approved on a case-by-case basis.

III. SMOKE CONTROL SYSTEMS

Refer to Technical Bulletin BLDG-9-1, Design and Testing Requirements for Smoke Control Systems, for required wiring methods for Smoke Control systems. Where two-hour cabling and cable systems are required, the design may employ the methods specified in this technical bulletin, except MC (metallic clad) cable is not permitted for smoke control systems.

IV. GROUP R-2 OCCUPANCY REQUIREMENTS

In accordance with CBC Section 907, all Group R-2 occupancies required to have a fire alarm system must be provided with the capability to support the future installation of visible alarm notification appliances in all dwelling and sleeping units. CSFM Title 24 Code Interpretation #15-001, dated November 12, 2015, has determined that CBC Section 907 does not provide direction to pre-wire for these devices. However, a method of achieving compliance with these requirements must be shown on the fire alarm permit drawings. The Project Scope of Work must clearly describe the method that will be utilized to achieve compliance .

V. OTHER PERMITS

The associated work described below requires separate permits or approvals. If work is to be performed by others, please indicate on plans that work will be “furnished by others” or “under separate approval.”

A. New Breaker, Fuse or Disconnect Switch

Installing a new dedicated circuit breaker, fuse or disconnect switch per NFPA 72, Chapter 10 for primary power branch circuits for fire alarm control panel (FACP), NAC power supply, and communications methods involving modification to an existing electrical service panel will require obtaining a separate electrical permit.

1. If disconnecting means is via a circuit breaker, a listed circuit breaker locking device shall be installed per NFPA 72, Chapter 10.

2. Branch circuits are required to comply with CEC Article 760 when supplying fire alarm equipment and no other loads. The location of the branch-circuit overcurrent protective device shall be permanently identified at the fire alarm control unit. The circuit disconnecting means shall have red identification, shall be accessible only to qualified personnel, and shall be identified as "FIRE ALARM CIRCUIT." The red identification shall not damage the overcurrent protective devices or obscure the manufacturer's markings. The dedicated fire alarm primary power circuit shall not be supplied through a ground-fault circuit interrupter (GFCI) or an arc-fault circuit interrupter (AFCI).

B. Underground Conductors

Installing underground conductors and conduit are subject to City of San Diego Stormwater Standards.

Documents referenced in this Technical Bulletin
• **California Building Code (CBC)**
• **California Fire Code (CFC)**
• **California Electrical Code (CEC)**
• **National Fire Alarm and Signaling Code, (NFPA 72)**
• **Information Bulletin 137, How to Obtain a Permit for Fire Alarm Systems**
• **Technical Bulletin BLDG-9-1, Design and Testing Requirements for Smoke Control Systems**
• **California State Fire Marshal Title 24 Code Interpretation, #14-006 (July 29, 2014)**
• **California State Fire Marshal Title 24 Code Interpretation, #15-001 (November 12, 2015)**