

ENGINEERING SPECIFICATION

EMERGENCY AND FIRE ALARM AUDIO SYSTEM

PART 1.0 - GENERAL

1.1. DESCRIPTION:

- A. This section of the specification includes the furnishing, installation, connection and testing of the Emergency and Fire Alarm Audio System.
- B. The Emergency and Fire Alarm Audio System shall comply with NFPA 72 requirements.
 - 1. The Secondary Power Source of the Emergency and Fire Alarm Audio System will be capable of providing at least 24 hours of backup power with the ability to sustain 15 minutes in alarm at the end of the backup period.
- C. The Emergency and Fire Alarm Audio System shall be manufactured by an ISO 9001 certified company.
- D. The Emergency and Fire Alarm Audio System and peripheral devices shall be manufactured 100% by a North America manufacturer.
- E. Underwriters Laboratories Inc. (UL/ULC):

- UL 864 Standard for Control Units for Fire Protective Signaling Systems
 - ULC S527 Standard for Control Units for Fire Protective Signaling Systems
 - UL 1711 Amplifiers for Fire Protective Signaling Systems

Other:

- NEC Article 250 Grounding
 - NEC Article 300 Wiring Methods
 - NEC Article 760 Fire Protective Signaling Systems

- 1. The Emergency and Fire Alarm Audio System shall be ANSI 864, 9th Edition Listed.

- F. The installing company shall employ NICET (minimum Level II Fire Alarm Technology) technicians on site to guide the final check-out and to ensure the systems integrity.

1.2. SCOPE:

- A. An Emergency and Fire Alarm Audio System shall be installed in accordance with the project specifications and drawings.

1.3. SUBMITTALS

A. General:

1. Two copies of all submittals shall be submitted to the Architect/Engineer for review.

2. All references to manufacturer's model numbers and other pertinent information herein is intended to establish minimum standards of performance, function and quality. Equivalent compatible UL/ULC-listed equipment from other manufacturers may be substituted for the specified equipment as long as the minimum standards are met.

3. For equipment other than that specified, the contractor shall supply proof that such substitute equipment equals or exceeds the features, functions, performance, and quality of the specified equipment.

B. Shop Drawings:

1. Sufficient information, clearly presented, shall be included to determine compliance with drawings and specifications.

2. Include manufacturer's name(s), model numbers, ratings, power requirements, equipment layout, device arrangement, complete wiring point-to-point diagrams, and conduit layouts.

3. Show system layout, configurations, and terminations.

C. Manuals:

1. Submit simultaneously with the shop drawings, complete operating and maintenance manuals listing the manufacturer's name(s), including technical data sheets.

2. Wiring diagrams shall indicate internal wiring for each device and the interconnections between the items of equipment.

3. Provide a clear and concise description of operation that gives, in detail, the information required to properly operate the equipment and system.

D. Software Modifications

1. Provide the services of a qualified technician to perform all system software modifications, upgrades or changes.

2. Provide all hardware, software, programming tools and documentation necessary to modify the Emergency and Fire Alarm Audio System on site. Modification includes addition and deletion of messages, circuits, zones and changes to system operation. The system structure and software shall place no limit on the type or extent of software modifications on-site.

1.4. GUARANTY:

All work performed and all material and equipment furnished under this contract shall be free from defects and shall remain so for a period of at least one (1) year from the date of acceptance. The full cost of maintenance, labor and materials required to correct any defect during this one year period shall be included in the submittal bid.

1.5. MAINTENANCE:

A. Maintenance and testing shall be on a semi-annual schedule or as required by the local AHJ. A preventive maintenance schedule shall be provided by the contractor describing the protocol for preventive maintenance. The Emergency and Fire Alarm Audio System shall be tested in accordance with the requirements of NFPA 72.

B. As part of the bid/proposal, include a quote for a maintenance contract to provide all maintenance, tests, and repairs described below. Include also a quote for unscheduled maintenance/repairs, including hourly rates for technicians trained on this equipment, and response travel costs for each year of the maintenance period. Submittals that do not identify all post contract maintenance costs will not be accepted. Rates and costs shall be valid for the period of five (5) years after expiration of the guaranty.

1.6. POST CONTRACT EXPANSIONS:

A. The contractor shall have the ability to provide parts and labor to expand the system specified, if so requested, for a period of five (5) years from the date of acceptance.

B. As part of the submittal, include a quotation for all parts and material, and all installation and test labor as needed to increase the number of speaker's zones or wattage by ten percent (10%).

C. The quotation shall include installation, test labor, and labor to reprogram the system for this 10% expansion. If additional Emergency and Fire Alarm Audio System hardware is required, include the material and labor necessary to install this hardware.

D. Do not include cost of conduit or wire or the cost to install conduit or wire except for labor to make final connections at the Emergency and Fire Alarm Audio System.

E. Submittals that do not include this estimate of post contract expansion cost will not be accepted.

1.7. APPLICABLE STANDARDS AND SPECIFICATIONS:

The specifications and standards listed below form a part of this specification. The system shall fully comply with the latest issue of these standards, if applicable.

A. National Fire Protection Association (NFPA) - USA:

- No. 70 National Electric Code (NEC)
- No. 72 National Fire Alarm Code
- No. 101 Life Safety Code

B. The system and its components shall be Underwriters Laboratories, Inc. listed under the appropriate UL testing standard as listed herein for fire alarm applications and the installation shall be in compliance with the UL listing.

C. Local and State Building Codes.

D. All requirements of the Authority Having Jurisdiction (AHJ).

1.8. APPROVALS:

A. The system shall have proper listing and/or approval from the following nationally recognized agencies:

UL	Underwriters Laboratories Inc (UL 864 Ninth Edition)
ULC	Underwriters Laboratories Inc (ULC-S527-11)
CSFM	California State Fire Marshal

PART 2.0 PRODUCTS

2.1. EQUIPMENT AND MATERIAL, GENERAL:

A. All equipment and components shall be new, and the manufacturer's current model. The materials, appliances, equipment and devices shall be tested and listed by a nationally recognized approvals agency for use as part of a fire protective signaling system, meeting the National Fire Alarm Code.

B. All equipment and components shall be installed in strict compliance with manufacturers' recommendations. Consult the manufacturer's installation manuals for all wiring diagrams, schematics, physical equipment sizes, etc., before beginning system installation.

C. All equipment shall be attached to walls and ceiling/floor assemblies and shall be held firmly in place (e.g., speakers shall not be supported solely by suspended ceilings). Fasteners and supports shall be adequate to support the required load.

D. All equipment must be available "over the counter" through the Security Equipment Distributor (SED) market and can be installed by dealerships independent of the manufacturer.

2.2. CONDUIT AND WIRE:

A. Conduit:

1. Conduit shall be in accordance with The National Electrical Code (NEC), local and state requirements.

2. Where required, all wiring shall be installed in conduit or raceway. Conduit fill shall not exceed 40 percent of interior cross sectional area where three or more cables are contained within a single conduit.

3. Cable must be separated from any open conductors of power, or Class 1 circuits, and shall not be placed in any conduit, junction box or raceway containing these conductors, per NEC Article 760.

4. All circuits shall be provided with transient suppression devices and the system shall be designed to permit simultaneous operation of all circuits without interference or loss of signals.

5. Conduit shall not enter the Emergency and Fire Alarm Audio System, or any other remotely mounted panel equipment or backboxes, except where conduit entry is specified by the Emergency and Fire Alarm Audio System manufacturer.

6. Conduit shall be 3/4 inch (19.1 mm) minimum.

B. Wire:

1. All Emergency and Fire Alarm Audio System wiring shall be new.

2. Wiring shall be in accordance with local, state and national codes (e.g., NEC Article 760) and as recommended by the manufacturer of the Emergency and Fire Alarm Audio System. Number and size of conductors shall be as recommended by the Emergency and Fire Alarm Audio System, but not less 14 AWG (1.63 mm) for Notification Appliance Circuits.

3. All wire and cable shall be listed and/or approved by a recognized testing agency for use with a protective signaling system.

4. Wire and cable not installed in conduit shall have a fire resistance rating suitable for the installation as indicated in NEC 760 (e.g., FPLR).

5. All field wiring shall be electrically supervised for open circuit and ground fault.

C. Terminal Boxes, Junction Boxes and Cabinets:

All boxes and cabinets shall be UL/ULC listed for their use and purpose.

D. The Emergency and Fire Alarm Audio System shall be connected to a separate dedicated branch circuit, 15 amperes circuit breaker rating. This circuit shall be labeled at the main power distribution panel as Emergency and Fire Alarm Audio System. Emergency and Fire Alarm Audio System primary power wiring shall be 12 AWG. The panel cabinet shall be grounded securely to either a cold water pipe or grounding rod.

1. The Emergency and Fire Alarm Audio System notification circuit (NAC 1 & 2) shall also automatically synchronize any of the following manufacturer's notification appliances connected to them: Mircom, System Sensor, Wheelock, or Gentex with no need for additional synchronization modules.

2.3. Emergency and Fire Alarm Audio System:

A. The Emergency and Fire Alarm Audio System shall be a Mircom **QX-MINI**. The main control board shall distribute and control emergency voice messages over the speaker circuits.

B. The system shall provide the capability to interface to **LOC (Local Operator Console)**, Distributed Audio Amplifiers and Remote Microphones from the same manufacturer.

C. Shall have as minimum requirements:

1. Integral 30 Watt, 25 volts audio amplifier with software selectable for 70 volts systems. The system shall be capable of expansion to 60 watts total via the insertion of an additional 30-watt audio amplifier module into the same cabinet and expandable to 360 watts.

2. Speaker circuit that can be wired both Class A and B.

3. Digital Message with a memory capacity for up to 12 minutes of audio messages in total. The Digital Message shall be capable of producing twelve distinct messages. The software configurator can be used to select default messages; import custom message, record custom message and **Text To Speech** (Type in message produces a voice message).
4. Designed to meet the NFPA 72 sleeping space requirement to produce a fundamental frequency of 520 Hz +/- 10% with a square wave or its equivalent.
5. Built in alert tone patterns with March Code, California, Steady, Alert Tone, Temporal, 520HZ, Continuous Whoop, or No Tone is field programmable. Tone Prior to transmitting a message, the Emergency and Fire Alarm Audio System can be programmed to produce a pre-announce and post-announce tone.
 - a. Repeat Forever Select the number of times the message will be repeated during an alarm. A message can be repeated 0, 1, 2, 3, 4, 5, 6, 7, 8, 9, 10, or an *Infinite* amount of times.
6. The Emergency and Fire Alarm Audio System will be capable of detecting and annunciating the following conditions: Loss of Power (AC and DC), System Trouble, Ground Fault, Alarm, Trouble and Amplifier Fault.
7. The Emergency and Fire Alarm Audio System shall be fully supervised including microphone, amplifier output, speaker wiring, and tone generation.
8. Speaker outputs shall be fully power-limited.
9. Amplifiers will be supplied power independently to eliminate a short on one circuit from affecting other circuits.
10. The Emergency and Fire Alarm Audio System will provide full supervision on alarm and standby conditions.
11. Wiring terminals shall be removable terminal blocks (Wire Gauge 12 - 22 AWG) for ease of servicing.
12. Emergency and Fire Alarm Audio System will provide 2 Notification Appliance Circuit (NAC) output (2.5 Amps per NAC circuit total of 5.0 Amps) with sync generator or follower for Mircom, System Sensor, Wheelock or Gentex protocols. The each NAC shall be capable of One (1) Style Y (Class B) or Style Z (Class A) circuit.
13. Shall have two Relay Input Circuits to activate messages via contact closures.
14. On-board battery charger which supports charging up to 75 AH batteries (cabinet holds up to 18AH batteries).
15. Programmable delay of none, one hour, two hours or three hours reporting of AC Loss.
16. Built in Piezo sounder for local trouble.

17. Shall have Visual Lamp/Indicator Test switch and shall activate all system LEDs.
18. Shall have three Form-C relays:
 - Alarm Relay
 - AC Power Trouble Relay
 - Common Trouble Relay
19. Shall have a Special Application (auxiliary power) 24 VDC filtered 0.2 Amp output for addressable modules when interfaced with compatible addressable FACPs and End-of-Line power supervision relays.
20. The Emergency and Fire Alarm Audio System can communicate in any combination up to six (6) external remote consoles:
 - Optional Remote Microphone
 - Optional Local Operator Console
21. The Emergency and Fire Alarm Audio System can communicate in any combination up to five (5) external distributed audio amplifiers:
 - Optional Distributed Amplifier, 30 watts.
22. The Emergency and Fire Alarm Audio System can be integrated by a Mircom FACP via the SLC communications. Compatible FACPs include the FX-2000, FleX-Net and FX-3500.
23. The Emergency and Fire Alarm Audio System can be interface with other UL Listed Fire Alarm Control Panels via activation by contact closure.

D. Speakers:

1. The plug-in speaker allows the installer to pre-wire mounting plates and dress the wires before plugging in the speakers.
2. All speakers shall operate on 25 or 70 Volts with field selectable output taps from 0.25 to 2.0 Watts.
3. Speakers in corridors and public spaces shall produce a minimum sound levels of 75 dBA output at 10 feet (3m).
4. Rotary switch simplifies field selection of speaker voltage and power settings.
5. Frequency response shall be a minimum of 400 HZ to 4000 HZ.
6. Flush mount applications are achievable without the need for an extension ring.

E. Enclosures:

1. The Emergency and Fire Alarm Audio System Voice shall be housed in a UL/ULC-listed cabinet suitable for flush or surface mounting. The cabinet and front shall be corrosion protected and painted red.

2. The backbox and door shall be constructed of steel with provisions for electrical conduit connections into the sides and top.
3. The door shall provide a key lock and shall provide for the viewing of all indicators.

F. Power Supply:

1. The main power supply for the Emergency and Fire Alarm Audio System shall provide up to 9.5 amps of available power for the panel and peripheral devices.
2. The power supply shall provide an integral battery charger up 75AH. Battery arrangement may be configured in the field.
3. The main power supply shall continuously monitor all field wires for earth ground conditions.
4. The main power supply shall operate on 120 VAC, 60 Hz or 240 VAC, 50 Hz, and shall provide all necessary power for the Emergency and Fire Alarm Audio System.

G. BATTERIES:

1. Upon loss of Primary (AC) power to the Emergency and Fire Alarm Audio System, the batteries shall have sufficient capacity to power the Emergency and Fire Alarm Audio System for required standby time (24 or 60 hours) followed by 15 minutes of alarm.
2. The batteries are to be completely maintenance free. No liquids are required. Fluid level checks for refilling, spills, and leakage shall not be required.

PART 3.0 - EXECUTION

3.1. INSTALLATION:

A. Installation shall be in accordance with the NEC, NFPA 72, local and state codes, as shown on the drawings, and as recommended by the major equipment manufacturer.

B. All conduit, junction boxes, conduit supports and hangers shall be concealed in finished areas and may be exposed in unfinished areas. Smoke detectors shall not be installed prior to the system programming and test period. If construction is ongoing during this period, measures shall be taken to protect speakers from contamination and physical damage.

3.2. TEST:

The service of a competent, factory-trained engineer or technician authorized by the manufacturer of the fire alarm equipment shall be provided to technically supervise and participate during all of the adjustments and tests for the system. All testing shall be in accordance with NFPA 72.

A. Before energizing the cables and wires, check for correct connections and test for short circuits, ground faults, continuity, and insulation.

B. Open and short notification appliance circuits and verify that trouble signal actuates.

C. Ground all circuits and verify response of trouble signals.

D. Check presence and audibility of tone at all alarm notification devices.

E. When the system is equipped with optional features, the manufacturer's manual shall be consulted to determine the proper testing procedures. This is intended to address such items as verifying voice/audio messages.

3.3. FINAL INSPECTION:

A. At the final inspection a minimum NICET Level II technician shall demonstrate that the system functions properly in every respect.

3.4. INSTRUCTION:

A. Instruction shall be provided as required for operating the system. Hands-on demonstrations of the operation of all system components and the entire system including program changes and functions shall be provided.

B. The contractor or installing dealer shall provide a user manual indicating "Sequence of Operation."