

**SECTION 27 51 23  
INTERCOMMUNICATIONS AND PROGRAM SYSTEMS**

SPEC WRITER NOTES:

1. Edit this specification section between //\_\_\_\_//, to fit project, or delete if not applicable.
2. Contact VA's AHJ, Spectrum Management and COMSEC Service (SMCS 0050P2H3), (202-461-5310), for all technical assistance.
3. Included throughout this specification are references to system's interface capability and various related features. System designer must verify availability of this system and coordinate associated requirements and subsequent interfaces.

**PART 1 - GENERAL**

**1.1 DESCRIPTION**

- A. This section specifies a new and fully operating Intercom (IC) System.
- B. Conform to VAAR 852.236.91 and intent of the construction documents, recognizing that it may be impracticable to detail all items because of variances in manufacturers to achieve indicated intent.

**1.2 RELATED WORK**

- A. Connection to Electronic Access Control at doors: Section 28 13 00, PHYSICAL ACCESS CONTROL SYSTEM.
- B. Door hardware and operation of doors: 08 71 00 DOOR HARDWARE
- C. Conduit and boxes: Section 27 05 33, RACEWAYS AND BOXES FOR COMMUNICATIONS SYSTEMS.
- D. Electrical conductors and cables: Section 27 10 00, CONTROL, COMMUNICATION AND SIGNAL WIRING.
- E. Requirements for personnel safety and to provide a low impedance path to ground for possible ground fault currents: Section 27 05 26, GROUNDING AND BONDING FOR COMMUNICATIONS SYSTEMS.
- F. When interfaced for Security Emergency Communications: Section 28 52 31, EMERGENCY CALL SYSTEM.
- G. Requirements for interfacing with Facility's SMS: Section 28 31 00, PHYSICAL ACCESS CONTROL SYSTEM.

**1.3 SUBMITTALS**

- A. In addition to requirements of SECTION 27 05 11, REQUIREMENTS FOR COMMUNICATIONS INSTALLATIONS, submit:

1. Written certification from OEM proposed provider of contract maintenance is an authorized representative of OEM. Include provider's legal name, address, and OEM credentials.
2. Submit names, locations and point of contact for three installations employing proposed OEM IC Systems of comparable size and complexity performing for at least one year after final acceptance by user.

B. Certifications:

1. Submit documentation that supplier has been an authorized distributor and service organization for OEM for a minimum of three years and is authorized by OEM to pass thru OEM's warranty of installed equipment to Government.
2. Submit certificate of successful completion of OEM's installation and training program for each installing technician of equipment being proposed. Provide current OEM certifications for installers to be approved by COR before being allowed to commence work on system.
3. Provide current OEM certification documenting maintenance and supervisory personnel are authorized by OEM to service installed equipment during warranty.
4. Furnish copies of applicable national, state and local licenses.

C. Warranty: Submit OEM warranty.

D. Needs Assessment Report: Provide a summary report of the needs assessment meeting conducted with nursing manager of each unit, as required by this section.

E. Maintenance Material Submission:

1. Provide one spare 304 m (1,000 foot) roll of accepted system (not microphone) cable.

**1.4 QUALITY ASSURANCE**

- A. Assign only technicians trained, qualified, and certified by OEM on engineering, installation, operation and testing of system.
- B. Provide system firmware from OEM with a proven history of product reliability and sole control over all source code.

**1.5 WARRANTY**

- A. Comply with FAR clause 52.246-21, except that warranty must be as follows:
  1. Manufacturer shall warranty their equipment and certified installation for a minimum of two years from date of installation and final acceptance by the Government.

2. Provide, free of charge, product firmware and software upgrades for a period of one year from date of final acceptance by Government for any product feature enhancements.

## **PART 2 - PRODUCTS**

### **2.1 GENERAL**

- A. Provide voice communication between wall-mounted intercom stations and desk or wall-mounted master stations.
- B. Provide accessories and miscellaneous appurtenances required for a complete and operating communications system and network.
- C. Coordinate features and select components to form an integrated IC system. Match components and interconnections for optimum performance of specified functions.
- D. Expansion Capability: Increase number of Room Speaker-Microphone stations in future by 25 percent above those indicated without adding any internal or external components or trunk cable conductors.
- E. Equipment: Modular type, continuous duty rated.
- F. Weather-Resistant Equipment: Listed by a National Recognized Testing Laboratory (NRTL) for operation in wet, damp or outdoor locations.
- G. Install IC head end equipment in room // \_\_\_\_\_ // and connect rooms // \_\_\_\_\_ //. Provide zoned, one-way voice paging through distributed, wall-mounted units. Interconnect so voice input into IC is by zone from main console at // \_\_\_\_\_ //.

### **2.2 PERFORMANCE CRITERIA**

- A. In addition to requirements of Section 27 05 11, REQUIREMENTS FOR COMMUNICATIONS INSTALLATIONS, the minimum requirements for each system are:
  1. Wired IC systems approved to connect to separate communications system (i.e. SMS, WAN, LAN includes: Telephone, Nurse Call, radio paging, wireless systems) minimum requirements:
    - a. NIST FIPS Pub 140/2.
    - b. UL 60950-1, edition 2.

#### **SPEC WRITER NOTES:**

1. Each wireless system connection must be approved prior to contract bid by VA headquarters SMCS 0050P2H3..
2. IEC 62368-1 ed 2: 2014.
3. Code of Federal Regulations, Title 47, Part 15 (or FCC Part 15)  
Listed Radio Equipment is not permitted. //

- B. Provide system with configuration programming capable of being executed remotely via a remote connection (when specifically accepted by Spectrum Management and COMSEC Services (SMCS 0050P2H3) without any exchange of parts.

### 2.3 EQUIPMENT ITEMS

#### A. Manually Switched System:

##### 1. Master Station Features:

- a. Communicate selectively with all other master and speaker-microphone stations by actuation of selector switches.
- b. Communicate simultaneously with other stations by actuation of a single all-call switch.
- c. Communicate with individual stations in privacy.
- d. Include other master-station connections in a multiple-station conference call.
- e. Override any conversation by a designated master station.

##### 2. Room Speaker-Microphone Station Features:

- a. Privacy from remote monitoring with a warning tone signal and visual indication at monitored station.
- b. Privacy switches at designated speaker-microphone stations to prevent another station from listening and to permit incoming calls.
- c. Communicate hands free.
- d. Call master station by actuating call switch.
- e. Return busy signal to indicate that station is already in use.

##### 3. Speakers: Free of noise and distortion during operation and when in standby mode.

#### B. Microprocessor-Switched System:

##### 1. Master Station Features:

- a. Communicate selectively with other master and speaker-microphone stations by dialing station's number on a 12-digit keypad.
- b. Communicate simultaneously with all other stations by dialing a designated number on a 12-digit key-pad.
- c. Communicate with individual stations in privacy.
- d. Include other master-station connections in a multiple-station conference call.
- e. Access separate paging speakers or groups of paging speakers by dialing designated numbers on a 12-digit keypad.
- f. Override any conversation by a designated master station.

- g. Display selected station.
  - h. Volume Control: Regulate incoming-call volume.
  - i. LED: Identify calling stations and stations in use. Remains illuminated until call is answered.
  - j. Momentary audible tone signal: Announce incoming calls.
  - k. Handset with Hook Switch: Telephone type with 61 cm (24-inch) long, permanently coiled cord. Hook switch to disconnect speaker when handset is lifted.
  - l. Reset Control: Cancels call and resets system for next call.
  - m. Equipment Cabinet:
    - 1) Comply with EIA/ECA 310-E Cabinets, and Associated Equipment Standard.
    - 2) Lockable.
    - 3) Ventilated metal cabinet houses terminal strips, power supplies, amplifiers, system volume control, and other switching and control devices required for conversation channels and control functions.
  - n. Vertical Equipment Rack:
    - 1) 28" (16RU) rack space.
      - a) Welded steel construction.
      - b) Minimum 198 cm (78 inches) usable height.
      - c) Adjustable front mounting rails.
    - 2) Install the following appurtenances provided by same manufacturer or as specified:
      - a) Security screws w/ nylon isolation bushings.
      - b) Textured blank panels.
      - c) Custom mounts for components without rack mount kits.
      - d) Security covers.
      - e) Copper Bus Bar.
      - f) Power Sequencer- rack-mounted power conditioner // and delayed sequencers // with two unswitched outlets // each // and contact closure control inputs.
2. Room Speaker-Microphone Station Features:
- a. Privacy from remote monitoring with a warning tone signal and visual indication at monitored station.
  - b. Privacy switches at designated speaker-microphone stations to prevent another station from listening and to permit incoming calls.

- c. Communicate hands free.
- d. Call master station by actuating call switch.
- e. Return busy signal to indicate that station is already in use.
- f. Free of noise and distortion during operation and when in standby mode.

## SPEC WRITER NOTES:

- 1. Spec Writer must obtain approval by VA Headquarters SMCS 0050P2H3 for each wireless system.

## C. Wireless:

## 1. Radio Systems:

- a. Provide IC system with ability to operate only with VA certified and licensed radio system (FCC Part 15 listed pagers and transmitters are not allowed for "Safety of Life" functions or installed in those specific areas) and with the following features:
  - 1) Ability to pass-through location information (such as a room number) and call-type as well as other text messages simultaneously to shift supervisor identified staff members.
  - 2) Allow operator to select staff members by name or pager number and select system message consisting of room number and condition code (such as priority level) or type text to be read by holder of pager unit.
  - 3) While a patient station is connected to nurse's master station, allow operator to automatically page staff member assigned to that room.
    - a) An alternate staff member can be selected for paging purposes in place of primary staff member.
    - b) Allow alternate staff member to be paged when primary staff member is unable to respond to patient's needs within a specified period of time.
    - c) Assign any bed to any pager or pager group.
    - d) Assign an unlimited amount of pagers to any patient bed.
  - 4) Ability to send code calls to staff members by predetermined group automatically by pressing one "Code Blue" button.
    - a) Indicate room number of code call.
    - b) State "Code Blue" in plain English format on pagers
    - c) FCC Part 15 listed pagers are not allowed to be used for these" functions or in those specific locations.

2. Personal Wireless Communicator:
  - a. Connect to personal wireless communications system.
  - b. Pass text data.
  - c. Provides 2-way communication between Telephone or LAN/WAN Interface.
  - d. Not FCC Part 15 listed device.
  - e. Meets or exceeds UL 60950-1, edition 2.
  - f. Meets Office of Cyber and Information Security (OCIS) Guide Lines for NIST FIPS Pub 140/2 certification.
  - g. Includes training program with recertifications for staff.

SPEC WRITER NOTE:

1. Contact SMCS 0050P2H3 (202) 461-5310 for specific required pre-approvals for other equipment (full or conditional).

3. //Other Wireless Equipment/Systems: \_\_\_\_\_ . //

#### 2.4 HEAD END EQUIPMENT

- A. Provide required power supplies, communications hubs, network switches, intelligent controllers and other devices necessary to form a complete system.
- B. Head end components can be rack mounted or wall mounted in a metal enclosure.
- C. Provide head end equipment in telecommunications room where IC system is installed.
- D. Provide minimum 30 minute battery back-up (or UPS) to system components.
- E. // Provide complete IC System electronic supervision from Facility Police SMS Console in Police Control Room; and, interface Emergency (or Disaster Control Room) Console with alternate control capability. //

#### 2.5 SYSTEM CABLES

- A. Comply with SECTION 27 10 00, CONTROL, COMMUNICATION AND SIGNAL WIRING for specific installation and testing requirements.
- B. Conductors: Jacketed, twisted pair and twisted multipair, untinned solid copper; sizes as recommended by system manufacturer, but no smaller than No. 22 AWG.
- C. Insulation: Thermoplastic; minimum 0.8 mm (1/32 inch) thick.
- D. Shielding: For speaker-microphone leads and elsewhere where recommended by manufacturer; No. 34 AWG, tinned, soft-copper strands formed into a braid or equivalent foil.
- E. Minimum Shielding Coverage on Conductors: 60 percent.

F. Cabling must be riser rated //, plenum rated in designated spaces // .

SPEC WRITER NOTES:

1. Flexible Metal Tubing and communications raceway may be specified when specifically accepted by SMCS 0050P2H3 during project design phases.
2. Centralized mechanically partitioned wireways and cable trays may be used to augment main distribution conduit on a case by case basis when specifically accepted by SMCS 0050P2H3.

## 2.6 RACEWAYS

- A. Raceways and Boxes: Comply with requirements in Section 27 05 33, RACEWAYS AND BOXES FOR COMMUNICATIONS SYSTEMS.
- B. Each open top raceway must be NRTL listed for telecommunications systems and partitioned with metal partitions in order to comply with NEC Parts 517 and 800 to "mechanically separate" telecommunications systems of different service, protect installed cables from falling out when vertically mounted and allow junction boxes to be attached to the side to interface "drop" type conduit cable feeds.
- C. IC System Cable Infrastructure: EMT and cable tray NRTL classified for suitability and NRTL listed for telecommunications.
- D. Pull boxes must be minimum 63.5 mm (2-1/2 inches) deep and 152.4 mm (6 inches) wide by 152.4 (6 inches) long.

## 2.7 SYSTEM CONDUIT

- A. Provide separate 25.4 mm (1 inch) minimum diameter //\_\_\_\_// conduit, for system installation.

## 2.8 UNINTERRUPTIBLE POWER SUPPLY (UPS)

- A. Provide UPS for system to allow normal operation and function (as if there was no AC power failure) in event of an AC power failure or during input power fluctuations for a minimum of 30 minutes.
- B. As an alternative solution, telephone system UPS can be utilized to meet this requirement at head-end location, as long as this function is specifically accepted by telephone contractor and COR.
  1. Do not make any attachments or connection to telephone system until specifically directed to do so, in writing, by COR.
- C. Provide UPS for active system components including:
  1. System Amplifiers.
  2. Microphone Consoles.
  3. System Interface Units.

4. Head End Equipment Racks.
5. Control Consoles.

## **2.9 FINISHES**

- A. Provide finishes for exposed work such as plates, racks, panels, speakers, etc. accepted by design professional, COR and 0050P3B.

## **PART 3 - EXECUTION**

### **3.1 EXAMINATION**

- A. Review and coordinate with telecommunications cabling installer for location of intercom equipment in Telecommunications Rooms.
- B. Verification of Conditions: Before beginning work, verify location, quantity, size and access for the following:
  1. Isolated ground AC power circuits provided for systems.
  2. Pull boxes, wall boxes, wire troughs, conduit stubs and other related infrastructure for systems.
  3. System components installed by others.
  4. Overhead supports and rigging hardware installed by others.
- C. Installer must immediately notify COR, general contractor and design professional in writing of any discrepancies.
- D. Needs Assessment:
  1. Provide a one-on-one meeting with nursing manager of each unit affected by installation of system.
  2. Review floor plans and drawings, educate nursing manager on functions of the equipment and gather details specific to individual units; coverage and priorities of calls; staffing patterns; and other pertinent details that affect system programming and training.
  3. Prepare a summary report of the assessment.

### **3.2 INSTALLATION**

- A. General:
  1. Install work plumb and square and in a manner consistent with standard industry practice.
  2. Protect work from dust, paint and moisture as dictated by site conditions. Contractor is responsible for protection of work until final acceptance by Government.
  3. Install equipment according to OEM's recommendations.
  4. Provide any hardware, adaptors, brackets, rack mount kits or other accessories recommended by OEM for complete assembly and installation.

5. Secure equipment firmly in place, including IC stations, speakers, equipment racks, system cables, etc.:
    - a. Supports, mounts, fasteners, attachments and attachment points must support loads with a safety factor of at least 5:1.
    - b. Do not impose weight of equipment on supports provided for other trades or systems.
    - c. Any suspended equipment or associated hardware must be certified by OEM for overhead suspension.
    - d. Contractor is responsible for means and methods in design, fabrication, installation and certification of any supports, mounts, fasteners and attachments.
  6. Coordinate cover plates with field conditions. Size and install cover plates to hide joints between back boxes and surrounding wall. Do not allow cable to leave or enter boxes without cover plates installed.
  7. Where cover plates are not fitted with connectors, provide grommeted holes in size and quantity required.
- B. Equipment Racks:
1. Fill unused equipment mounting spaces with blank panels or vent panels; match color to equipment racks.
  2. Provide security covers for devices not requiring routine operator control.
  3. Provide vent panels and cooling fans as required for operation of equipment within OEM's specified temperature limits.
    - a. Provide adequate ventilation space between equipment for cooling.
    - b. Follow manufacturer's recommendations regarding ventilation space between amplifiers.
  4. Provide insulated connections of raceway to equipment racks.
  5. Provide continuous conduit with no more than 40 percent fill between wire troughs and equipment racks for non-plenum-rated cable.
  6. Ensure each system is mechanically separated from each other in wireway.
- C. Wiring Practice: In addition to requirements in Section 27 10 00, STRUCTURED CABLING, adhere to the following additional practices:
1. Execute wiring in strict adherence to National Electrical Code, applicable local building codes and standard industry practices.
  2. Where raceway and wire way are EMT (conduit), wiring of differing classifications must be run in separate conduit.

3. Where raceway and wire way are an enclosure (rack, tray, wire trough, utility box) wiring of differing classifications which share same enclosure must be mechanically partitioned and separated by 102 mm (four inches). Where wiring of differing classifications must cross, they must cross perpendicular to one another.
4. Do not splice wiring anywhere along entire length of run.
5. Make sure cables are insulated and shielded from each other and from raceway for entire length of run.
6. Do not pull wire through any enclosure where a change of raceway alignment or direction occurs.
7. Do not bend wires to less than radius recommended by manufacturer.
8. Replace entire length of run of any wire or cable that is damaged or abraded during installation. There are no acceptable methods of repairing damaged or abraded wiring.
9. Do not apply wire pulling lubricants unless specifically recommended by cable OEM.
10. Use grommets around cut-outs and knock-outs where conduit or chase nipples are not installed.
11. Do not use tape-based or glue-based cable anchors.
12. Bond shields and drain wires to ground.
13. Terminate field wiring entering equipment racks as follows:
  - a. Provide service loops at harness break-outs, plates, panels and equipment to allow plates, panels and equipment to be removed for service and inspection.
  - b. Line level and speaker level wiring can be terminated inside equipment rack using specified terminal blocks.
  - c. Provide 15 percent spare terminals inside each rack.
  - d. Microphone level wiring can only be terminated at equipment served.
  - e. If specified terminal blocks are not designed for rack mounting, utilize 3/4 inch plywood or 1/8 inch thick aluminum plates/blank panels as a mounting surface.
  - f. Do not mount terminal blocks on bottom of rack.
  - g. Employ permanent strain relief for any cable with an outside diameter of 1 inch or greater.
14. Use only balanced audio circuits unless indicated otherwise.
15. Make connections as follows:

- a. Use rosin-core solder or mechanical connectors appropriate to application.
  - b. For crimp-type connections, use only crimp tool specified by manufacturer for the application.
  - c. Use only insulated spade lugs on screw terminals. Spade lugs must be sized to fit wire gauge; do not exceed two lugs per terminal.
  - d. Twist on wire connectors and electrical tape are not permitted for any application.
- D. Cable Installation: In addition to requirements in Section 27 10 00, STRUCTURED CABLING, comply to the following practices.
1. Acceptable means of cable support are cable tray, wire way, and conduit. Hook and loop wrap cable bundles loosely to cable tray with plenum rated Velcro straps. Plastic tie wraps are not permitted as a means to bundle or support cables.
  2. Run cables parallel to walls.
  3. Do not lay cables on top of luminaires, ceiling tiles, mechanical equipment, or ductwork.
  4. Maintain minimum 61 cm (2'-0") clearance from all shielded electrical apparatus.
  5. Test cables after the total installation is complete. Document test results. Remedy any cabling problems or defects in order to pass or comply with testing. This includes re-pull of new cable as required.
  6. Terminate both ends of cables per industry and OEM's recommendations.
  7. Provide proper temporary protection of cable after pulling is complete before final dressing and terminations are complete. Do not leave cable lying on floor. Bundle and tie wrap up off of the floor until ready to terminate.
  8. Cover end of overall jacket with minimum 25.4 mm (1 inch) length of transparent heat-shrink tubing.
    - a. Cut unused insulated conductors minimum 50.8 mm (2 inches) passed heat-shrink, fold back over jacket and secure with cable-tie.
    - b. Cut unused shield/drain wires minimum 50.8 mm (2 inches) passed heat-shrink cover shield/drain wires with heat-shrink tubing extending to overall jacket. Extend tubing 6 mm (1/4 inch) passed end of unused wires, fold back over jacket and secure with cable tie.

9. For each solder-type connection, cover bare wire and solder connection with heat-shrink tubing.
  10. Terminate conductors; no cable must contain unterminated elements. Make terminations only at outlets and terminals.
  11. Terminations: Arrange on numbered terminal strips in junction, pull, and outlet boxes; terminal cabinets; and equipment enclosures. Cables cannot be spliced.
  12. Bundle, lace, and train conductors to terminal points without exceeding OEM's limitations on bending radii. Install lacing bars and distribution spools.
  13. Cold-Weather Installation: Bring cable to room temperature before de-reeling. Heat lamps are not permitted.
  14. Cable must not be run through structural members or be in contact with pipes, ducts, or other potentially damaging items.
  15. Separation of Wires: (Refer to Raceway Installation)
    - a. Separate speaker-microphone, line-level, speaker-level, and power wiring runs.
    - b. Install in separate raceways or, where exposed or in same enclosure, separate conductors at minimum 30.5 cm (12 inches) apart for speaker microphones and adjacent parallel power and telephone wiring.
    - c. Separate other intercommunication equipment conductors as recommended by equipment manufacturer.
- E. System Conduit: Install manufactured conduit sweeps and long radius elbows according to wire and cable OEM instructions.
- F. Labeling:
1. Permanently mark switches, connectors, jacks, relays, receptacles and electronic and other equipment.
  2. Engrave and paint fill receptacle panels using minimum 3.17 mm (1/8 inch) high lettering and contrasting paint.
  3. For rack-mounted equipment, use engraved Lamacoid labels with white minimum 3.17 mm (1/8 inch) high lettering on black background. Label front and back of rack-mounted equipment.
  4. Where multiple pieces of equipment reside in same rack group, label each indicating to which room, channel, receptacle location, etc. they correspond.
  5. Permanently label cables at each end, including intra-rack connections. Labels must be covered by same, transparent heat-shrink

tubing covering end of overall jacket. Alternatively, provide computer generated labels of type which include a clear protective wrap.

6. Contractor's name cannot appear more than once on each continuous set of racks. Contractor's name cannot appear on wall plates or portable equipment.
7. Ensure each piece of OEM supplied equipment has appropriate NRTL labels for the service equipment is performing. Equipment installed not bearing NRTL label will not be permitted. Contractor is responsible to provide listed replacement equipment with approved NRTL label.

G. Protection during Installation:

1. Protect electronic devices during unpacking and installation by wearing electrostatic discharge (ESD) wrist straps tied to chassis ground.
2. Wrist straps must meet OSHA requirements for prevention of electrical shock, if technician comes in contact with high voltage.

H. Cutting and Patching:

1. Keep work area clear of debris and clean area daily at completion of work.
2. Patch and paint any wall or surface that has been disturbed by execution of this work.
3. Provide any additional cutting, drilling, fitting or patching required that is not indicated as provided by others to complete work or to make its parts fit together properly.
4. Do not damage or endanger fully or partially completed construction of Government or separate contractors by cutting, patching or otherwise altering such construction, or by excavation. Contractor cannot cut or otherwise alter such construction by facility or separate contractor except with written consent of Government or of such separate contractor; such consent cannot be unreasonably withheld. Contractor cannot unreasonably withhold consent to cutting or otherwise altering work, by facility or a separate contractor.
5. Where coring of in-place concrete is specified or required, including coring indicated under unit prices, location of such coring must be identified in the field and accepted by COR prior to commencement of coring work.

I. Fireproofing:

1. Fireproof openings where IC cables penetrate fire rated walls, floors and ceilings.
2. Provide conduit sleeves (if not already provided) for cables that penetrate fire rated walls and floors and ceilings. After cabling installation is complete, install fire proofing material in and around conduit sleeves and openings. Install fire proofing material thoroughly and neatly. Seal floor and ceiling penetrations.
3. Use only materials and methods that preserve integrity of fire stopping system and its rating.

J. Grounding:

1. Provide grounding system per Section 27 05 26, GROUNDING AND BONDING FOR COMMUNICATIONS SYSTEMS.
2. Ground cable shields and equipment to eliminate shock hazard and to minimize ground loops, common mode returns, noise pickup, cross talk, and other impairments.
3. Signal Ground Terminal: Locate at main equipment cabinet. Isolate from power system and equipment grounding.
4. Install grounding electrodes as specified in Section 27 05 26, GROUNDING AND BONDING FOR ELECTRICAL SYSTEMS.
5. Do not use "3rd or 4th" wire internal electrical system conductors for ground.
6. Do not connect system ground to building's external lightning protection system.
7. Do not "mix grounds" of different systems.

**3.3 FIELD QUALITY CONTROL**

- A. Assign only technicians trained, qualified, and certified by OEM on engineering, installation, operation, and testing of system.
- B. Performance Testing:
  1. Intermediate Testing:
    - a. After completion of 25 percent of installation of equipment, including one master station, and remote station, and prior to any further work, this portion of system must be pretested, inspected, and certified. Check each item of installed equipment to ensure appropriate NRTL labels are affixed, NFPA, Life Safety, and Joint Commission guidelines are followed, and proper installation practices are followed. Include a full operational test.

- b. Arrange for inspection and test conducted by a factory-certified representative to be witnessed by Government and SMCS 0050P2H3 at a minimum and COR. An identical inspection can be conducted between 65 and 75 percent of system construction phase, at direction of COR.
2. Pretesting:
    - a. Upon completing installation of system:
      - 1) Align, balance, and completely pretest entire system under full operating conditions.
      - 2) Verify (utilizing approved test equipment) system is operational and meets performance requirements of this standard.
      - 3) Verify that system functions are operational, and no unwanted aural effects, (e.g. signal distortion, noise pulses, glitches, audio hum, poling noise, etc.) are present. At a minimum, pretest each of the following locations:
        - a) Networked locations.
        - b) System trouble reporting.
        - c) System electrical supervision.
        - d) UPS operation.
    - b. Provide recorded system pretest measurements and written certification that system is ready for formal acceptance test to COR.
  3. Acceptance Test:
    - a. Schedule acceptance test date giving COR 30 days' written notice prior to date acceptance test is expected to begin. System must be tested in the presence of a Government representative and OEM-certified representative. System must be tested utilizing approved test equipment to certify proof of performance and emergency compliance. Test must verify that the total system meets specification requirements. Notification of acceptance test must include expected duration of time of the test.
  4. Acceptance Test Procedure:
    - a. Physical and Mechanical Inspection:
      - 1) Government representative may tour areas where system and sub-systems are completely and properly installed to ensure they are operationally ready for proof of performance testing. Prepare system inventory including available spare parts. Each

item of installed equipment must be checked to ensure appropriate NRTL labels are affixed.

- 2) System diagrams, record drawings, equipment manuals, Auto CAD Disks, intermediate, and pretest results must be inventoried and reviewed.
- 3) Failure of system to meet installation requirements of this specification can be grounds for terminating all testing.

b. Operational Test:

- 1) Contractor must demonstrate full functionality of system including:
  - a) Station to master calls.
  - b) Station to station calls.
  - c) Broadcast calls.
  - d) Location identification of stations at intercom master station.

c. Test Conclusion: Government will accept results of the test or require additional testing on deficiencies and shortages.

Retesting to comply with these specifications must be done at Government's convenience and contractor's expense.

### 3.4 TRAINING

- A. Provide training of facility-identified staff assigned to units receiving communications by an IC system. Implement training from master console operator's perspective, and likewise, for any person whose specific responsibilities include answering IC calls and dispatching an appropriate response, provide operational training from their perspective. A separate training room may be set up that allows this type of individualized training utilizing in-service training unit, prior to cut over of new system.
- B. Provide the following minimum training times and durations:
  1. // 24 // hours prior to facility opening,
  2. // 24 // hours during the standard work week, and
  3. // 24 // hours for supervisors and system administrators.

### 3.5 MAINTENANCE

- A. Provide Government personnel with ability to contact contractor and OEM for maintenance and logistic assistance, remote diagnostic testing, and assistance in resolving technical problems at any time, during warranty period.
- B. Response Time during Warranty Period:

1. COR is contractor's only official reporting and contact official for IC system trouble calls, during the warranty period.
2. A standard work week is considered 8:00 A.M. to 5:00 P.M. or as designated by COR, Monday through Friday exclusive of Federal holidays.
3. Respond and correct on-site trouble calls, during the standard work week:
  - a. A routine trouble call within one working day of its report. A routine trouble is considered a trouble which causes one IC station, or master IC station to be inoperable.
  - b. An emergency trouble call within four hours of its report.
    - 1) An emergency trouble is considered a trouble which causes a IC sub system or equipment cabinet, to be inoperable at any time.
    - 2) Emergency trouble calls include routine trouble calls in critical emergency health care facilities (i.e., cardiac arrest, intensive care units, etc.). COR must notify contractor of this type of trouble call.
4. If an IC component failure cannot be corrected within four hours (exclusive of the standard work time limits), provide alternate IC equipment.
5. Complete installation of alternate equipment/system within sixteen hours after the four hour trouble shooting time and restore operation of effected location to system performance standards.
6. Replace any sub-system or major system that cannot be corrected within one working day, with compatible temporary equipment returning system or sub-system to full operational capability, until repairs are complete.

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