
USACE / NAVFAC / AFCEC / NASA

UFGS 27 52 24 (August 2017)

Preparing Activity: USACE

Superseding

UFGS 27 41 00.00 10 (April 2006)

UFGS 27 52 23.00 20 (April 2006)

UFGS 27 52 32.00 10 (October 2007)

UNIFIED FACILITIES GUIDE SPECIFICATIONS

References are in agreement with UMRL dated April 2019

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SECTION 27 52 24

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SECTION 27 52 24

NURSE CALL SYSTEM

08/17

NOTE: This specification covers the requirements for requirements for nurse call systems in medical treatment facilities.

Adhere to UFC 1-300-02 Unified Facilities Guide Specifications (UFGS) Format Standard when editing this guide specification or preparing new project specification sections. Edit this guide specification for project specific requirements by adding, deleting, or revising text. For bracketed items, choose applicable item(s) or insert appropriate information.

Remove information and requirements not required in respective project, whether or not brackets are present.

Comments, suggestions and recommended changes for this guide specification are welcome and should be submitted as a Criteria Change Request (CCR)

PART 1 GENERAL

NOTE: The facility communications requirements will dictate the type of system to be installed and the location of nurse call equipment. The designer should review the applicable standards, and develop a good understanding of the different systems available, and their limitations. In developing the project specification, bear two thoughts in mind: keep it simple; keep it generic. Where services are specified "as indicated," coordinate with the drawings. In development of the drawings, use the same nomenclature for an item of equipment as it appears in the specification. Electrical service to

the nurse call system is required to be connected to the critical branch of the essential electrical system, if available. Verify environmental and servicing requirements for system components.

1.1 REFERENCES

The publications listed below form a part of this specification to the extent referenced. The publications are referred to within the text by the basic designation only.

INSTITUTE OF ELECTRICAL AND ELECTRONICS ENGINEERS (IEEE)

IEEE 602 (2007) Recommended Practice for Electric Systems in Health Care Facilities - White Book

NATIONAL FIRE PROTECTION ASSOCIATION (NFPA)

NFPA 70 (2017; ERTA 1-2 2017; TIA 17-1; TIA 17-2; TIA 17-3; TIA 17-4; TIA 17-5; TIA 17-6; TIA 17-7; TIA 17-8; TIA 17-9; TIA 17-10; TIA 17-11; TIA 17-12; TIA 17-13; TIA 17-14; TIA 17-15; TIA 17-16; TIA 17-17) National Electrical Code

NFPA 99 (2018; TIA 18-1) Health Care Facilities Code

NATIONAL INSTITUTE OF STANDARDS AND TECHNOLOGY (NIST)

NIST SP 800-82 (2015; Rev 2) Guide to Industrial Control Systems (ICS) Security

TELECOMMUNICATIONS INDUSTRY ASSOCIATION (TIA)

TIA-569 (2015d) Commercial Building Standard for Telecommunications Pathways and Spaces

U.S. DEPARTMENT OF DEFENSE (DOD)

DOD 8510.01 (2014; Change 1-2016; Change 2-2017) Risk Management Framework (RMF) for DoD Information Technology (IT)

DODI 8500.01 (2014) Cybersecurity

UFC 4-010-06 (2016; with Change 1, 2017) Cybersecurity of Facility-Related Control Systems

UNDERWRITERS LABORATORIES (UL)

UL 1069 (2007; Reprint Jun 2018) UL Standard for Safety Hospital Signaling and Nurse Call Equipment

1.2 DEFINITIONS

The glossary of definitions, abbreviations and acronyms, and units set forth in TIA-569 and UL 1069 apply to this Section, unless otherwise noted.

1.3 SUBMITTALS

NOTE: Review Submittal Description (SD) definitions in Section 01 33 00 SUBMITTAL PROCEDURES and edit the following list to reflect only the submittals required for the project.

The Guide Specification technical editors have designated those items that require Government approval, due to their complexity or criticality, with a "G". Generally, other submittal items can be reviewed by the Contractor's Quality Control System. Only add a "G" to an item, if the submittal is sufficiently important or complex in context of the project.

For submittals requiring Government approval on Army projects, a code of up to three characters within the submittal tags may be used following the "G" designation to indicate the approving authority. Codes for Army projects using the Resident Management System (RMS) are: "AE" for Architect-Engineer; "DO" for District Office (Engineering Division or other organization in the District Office); "AO" for Area Office; "RO" for Resident Office; and "PO" for Project Office. Codes following the "G" typically are not used for Navy, Air Force, and NASA projects.

The "S" following a submittal item indicates that the submittal is required for the Sustainability eNotebook to fulfill federally mandated sustainable requirements in accordance with Section 01 33 29 SUSTAINABILITY REPORTING. Locate the "S" submittal under the SD number that best describes the submittal item.

Choose the first bracketed item for Navy, Air Force and NASA projects, or choose the second bracketed item for Army projects.

Government approval is required for submittals with a "G" designation; submittals not having a "G" designation are for [Contractor Quality Control approval.] [information only. When used, a designation following the "G" designation identifies the office that will review the submittal for the Government.] Submittals with an "S" are for inclusion in the Sustainability eNotebook, in conformance to Section 01 33 29 SUSTAINABILITY REPORTING. Submit the following in accordance with Section 01 33 00 SUBMITTAL PROCEDURES:

SD-03 Product Data

System Hardware; G, DO
Bed Interface Outlet Station; G, DO
Patient Station - Single Audio; G, DO
Central Code Annunciation Station; G, DO
Cord Sets; G, DO
Cancel Station; G, DO
Code Blue Station; G, DO
Domeless Controller; G, DO
Dome Light; G, DO
Duty Station; G, DO
Equipment Alarm Station; G, DO
Nurse Call Control Cabinet; G, DO
Nurse Call - Lighting Interface; G, DO
Nurse Call - TV Interface; G, DO
Nurse Desk Console; G, DO
Pull Cord - With Audio; G, DO
Pull Cord; G, DO
Staff Emergency Station; G, DO
Staff Station; G, DO
Staff Terminal - Graphic Display; G, DO
NCTV Annunciator; G, DO
System Hardware; G, DO
Zone Light; G, DO

SD-05 Design Data

Uninterruptible Power Supply; G, DO
System Description; G, DO

SD-06 Test Reports

Acceptance Test Plan; G, DO
Inspection And Testing Plan; G, DO
Warranty Period Inspection And Testing

Acceptance Test Report

SD-07 Certificates

Accreditation

System Contractor Qualifications

Installer Qualifications

Manufacturer Qualifications

SD-08 Manufacturer's Instructions

Storage And Protection

SD-10 Operation and Maintenance Data

Service Facility; G, DO

Software Service Agreement; G, DO

Nurse Call System; G, DO

SD-11 Closeout Submittals

As-Built System Drawings; G, DO

1.4 QUALITY ASSURANCE

1.4.1 Regulatory Requirements

Provide Nurse call systems and equipment conforming to UL 1069, listed for purpose, and meeting requirements of the specified application.

1.4.2 Cybersecurity

NOTE: Balance nurse call system integration requirements with facility need and cybersecurity requirements. Simple nurse call systems may be segregated from the facility network and greatly reduce the cost of cybersecurity compliance. Nurse call functions must reside on the nurse call network to comply with UL 1069. The system interfaces may occur on other networks and require RMF evaluation.

- a. The Risk Management Framework (RMF) is the process by which information systems are accredited for operation by a designated official from the Using Military Department. It is the standard process under which all DoD information systems must achieve and maintain their Authority To Operate. The Cyber Security process is documented in DOD 8510.01 and NIST SP 800-82. Refer to UFC 4-010-06 for additional requirements.
- b. All systems that are IP addressable or interface with the Assured Network must be certified to operate. Coordinate with the Government to initiate and complete the accreditation process.

- c. Cybersecurity requires input from the system vendor or provider and support from the local IMD. The local IMD-IA office is the point of contact for all Cybersecurity requirements. The local CMIO is the point of contact for all clinical and functional system requirements.

1.4.3 Manufacturer Standard

Provide equipment that is the standard products of the same manufacturer, the latest design by the manufacturer, and designed by the manufacturer to operate as a complete system for the intended use. Provide a complete and usable system that meets the clinical and functional system requirements.

1.4.4 Service Facility

NOTE: Generally, the 4-hour response time shown bracketed should be suitable for most projects. Consult with the AIC/EIC on projects at remote locations.

Provide equipment supplemented by a factory authorized service organization, reasonably convenient to the site, which will provide service at the site within [4] [_____] hours after service is requested.

1.4.5 Qualifications

1.4.5.1 General Qualification Requirements

- a. The System Contractor, Installer and Manufacturer must each have the minimum qualifications specified, related to the type of system specified for this project.
- b. The Government reserves the right to accept or reject the System Contractor, Installer or Manufacturer based upon qualifications and ability to conform to specified requirements of this Section. System Contractors, Installers and Manufacturers that do not have the specified qualifications are not acceptable and are not allowed to perform the work of this Section.

1.4.5.2 System Contractor Qualifications

- a. Must be an authorized distributor and service organization for the Manufacturer of the provided systems for a minimum of five years.
- b. Must be regularly engaged in the system application design, documentation, installation, testing, training, and maintenance of the type of system specified in this Section, with a minimum of five years experience providing these services for systems having the same level of features and functions as the system being provided.
- c. System Contractor personnel assigned to this project must be factory trained or certified for the make and model of systems provided by the system Contractor to satisfy the specifications in this Section and must have a minimum of five years experience performing the services that they will perform for this project.

1.4.5.3 Lead Installer Qualifications

- a. Must be regularly engaged in the business of installation of the type of system specified in this Section.
- b. Must be factory trained or certified for the make and model of system provided by the system Contractor to satisfy the specifications in this Section and must have a minimum of five years experience in the installation of the specified types of system equipment and cables.

1.4.5.4 Manufacturer Qualifications

The Manufacturer must have a minimum of five years of experience in producing the type of system specified in this Section and be regularly engaged in the manufacture of UL 1069 listed Nurse Call Systems.

1.5 STORAGE AND PROTECTION

Store all products delivered and placed in storage with protection from the weather, humidity and temperature variation, dirt and dust, or other contaminants as recommended by the manufacturer.

1.6 MAINTENANCE MATERIAL SUBMITTALS

1.6.1 Software Service Agreement

Provide proposal to the facility for maintenance, licensing, sustainment, and any other costs as identified by the using services. Proposal must include costs for the next [5][_____] years divided into annual costs.

1.6.2 Extra Materials

**NOTE: Extra materials should not be provided for
Navy Projects.**

After the system has been acceptance tested and turned over to the Government for operation, furnish the minimum type and quantity of onsite spare parts as itemized below.

Quantity	Items
[_____]	Each type of Station
[_____]	Single Patient Station
[_____]	Dome Light
[_____]	Zone Lights
[_____]	Each type of UPS
[_____]	Push Button Cord Sets

Quantity	Items
[_____]	Pneumatic Cord Sets
[_____]	Pillow Speaker Cord Sets
[_____]	Dummy Plugs
[_____]	Sets of Main Terminal/Equipment Panel plug-in modules

PART 2 PRODUCTS

2.1 SYSTEM DESCRIPTION AND REQUIREMENTS

2.1.1 General Requirements

Submit installation wiring diagrams for each subsystem. Identify equipment that includes manufacturer's cabinets or backboxes as part of the equipment. Show details and minimum enclosure requirements as recommended by manufacturer if enclosure is not furnished with equipment. Show minimum size conduit as recommended by the manufacturer for use with each wire/cable shown.

2.1.1.1 Station Zones

Able to program [256][____] station zones for each master station in the network with [eight][____] priority levels and addressable visual and audible annunciation of audible devices.

2.1.1.2 Integration

System must provide integrated and centralized "Code Blue" [and "Staff Emergency"] calls.

2.1.1.3 Expansion Capability

Equipment ratings, housing volume, spare keys, switches, relays, annunciator modules, terminals, and cable conductor quantities adequate to increase the number of stations in the future by [25] [____] percent above those indicated without adding internal or external components or main trunk cable conductors.

[2.1.1.4 Existing System Compatibility

NOTE: Integration to an existing system will be outside of the new systems UL 1069 listing, and may require middleware to communicate between the two systems.

Functionally and electrically compatible with existing system so components and wiring operate as an extension or upgrade of the existing system and existing or upgraded functional performance of the existing system applies to the entire final system. Colors, tones, types, and durations of signal manifestation must be common among new and existing systems.

2.1.1.5 Resistance to Electrostatic Discharge

System, components, and cabling, and the selection, arrangement, and connection of materials and circuits, must be protected against damage or diminished performance when subjected to electrostatic discharges of up to 8,000 V in an environment with a relative humidity of 20 percent or less.

2.1.2 Signals

Provide dome light indications as recommended in IEEE 602 [except that code call signals must be flashing red and Code Blue signals must be flashing blue] or otherwise as directed by the Contracting Officer.

2.1.3 Call Annunciation Priorities

The annunciation of all call types must be sequenced in a four level priority and order, from a high of Number 1 to a low of Number 4. Coordinate Code Call names and meanings and priority levels with the Using Military Department.

Priority Level	Call Type
#1 Code	Code Blue Infant Abduction Call Patient Wandering Alarm
#2 Emergency	Emergency Bed Exit Alarm Medical Device Emergency Alarm Staff Assist Failure Alarm
#3 Priority	Patient Priority Call Cord Disconnected Bed Cable Disconnected
#4 Routine	Patient Routine Medical Device Routine Alarm Voice Intercom - Staff and Duty Stations

2.1.4 Display

Nurse Call System must display room status on personal computers, large display, or computerized and/or manual white boards as determined by using military department. Nurse Call whiteboard locations, size, and information displayed must be coordinated with the using military department and Defense Health Agency (DHA).

2.1.5 Reporting

- a. Provide Reporting Software with the system to allow for recording and reporting of system activity.
- b. Install Reporting Software on Personal Computers (PC) as identified by the using services, which must in turn be connected to the Nurse Call System Network. Provide PC coordinated with and approved by using services.

[c. Reporting Software must support real time system activity display.]

- d. Real time call waiting display with the ability to filter by call types and specific location. Display call information and sound call-in tones.
- e. Should the connection between the Nurse Call System and the Reporting Software PC be lost, a warning signal must be generated by the Reporting Software. An alert must be sent to a location specified by the using services in the event of a system failure.
- f. Reporting Software must allow users to generate/print reports on system activity. Control access to reports based on user name and password. Reports must be capable of indicating call priority, room number and patient information, call placed time, service reminder set, staff registration level. Reports must be exportable in a format specified by the using service.

Detailed Analysis of Call Data by Area
 Analysis of Call Data by Area
 Analysis of Call Data by Room/Bed
 Analysis of Call Data by Patient
 Patient Check-In Exception

- g. Reporting Software must support a networked operation in which the Reporting Software PC is connected to the nurse call LAN.

2.1.6 Uninterruptible Power Supply (UPS)

- a. Volt-Amp capacity must be at least 130 percent of the total volt-amp load of the equipment connected to the UPS. UPS must provide 15 minutes of runtime under the highest system load possible. Include power requirement calculations with design data submittal to verify power requirements.
- b. Upon an ac power line outage, the UPS must automatically transfer to battery power within 4.2 milliseconds of sensing ac power line loss, and provide at least 15 minutes of full power for operation of the equipment connected to the UPS. On-battery output voltage must be 115 VAC, +/-5 percent.
- c. The UPS must use sealed, maintenance free type batteries that have an expected life of at least three years. Power batteries from a constant voltage or "float type" battery charger. Recharge time to 90 percent capacity after discharge to 50 percent capacity must not exceed 10 hours.
- d. Surge energy rating must be at least 320 joules. Surge peak current capability must be at least 26 ka.
- e. UPS visual indicators on the UPS front panel must indicate on-line operation, output overload, low battery, and replace battery. [Provide network reporting of UPS functions and warnings.]

2.1.7 Nurse Call Tone-Visual (NCTV) System

- a. System hardware consists of a nurse call network comprised of power supplies, battery back-up, dome lights, pull cord stations, emergency push button stations, wiring and annunciator station, staff stations, duty stations, and zone lights. All necessary equipment required to

meet the intent of these specifications, whether or not enumerated within these specifications, must be supplied and installed to provide a complete and operating nurse/patient communications network.

- b. Call Routing - The system must support the routing of patient calls to any annunciator, pager, wireless/telephone network/handsfree/personally assignable communications devices or other annunciating device anywhere in the facility or to any combination of the above regardless of the location of the calling station. Calls may be routed and processed based on location, room assignment, priority or combination.
 - (1) The system must support the ability to swing any individual room or any group of rooms by touching one labeled touch point. Room(s) and consoles may be located anywhere within the facility through user menus.
 - (2) The system must allow a console to capture an individual clinic, selected clinics or all clinics in the facility through user menus.
 - (3) Each call priority must be reported via a user-defined mnemonic of up to 14 alphanumeric characters.
 - (4) Selectable call-in tone type, level, and corridor light behavior for each type of call priority.

2.1.1.8 Nurse Call Audio-Visual (NCAV) System

- a. System hardware consists of a nurse call network comprised of VoIP nurse consoles, PC consoles, nurse call network controllers, patient stations, power supplies, battery back-up, dome lights, entertainment cords, call cords, pull cord stations, emergency push button stations, staff stations, duty stations, zone lights, wiring and other options such as bed side-rail interfaces, computer interfaces, wireless/telephone network/handsfree/personally assignable communication devices, VoIP staff terminals, switches, servers, and network adapter module. All necessary equipment required to meet the intent of these specifications, whether or not enumerated within these specifications, must be supplied and installed to provide a complete and operating nurse/patient communications network.
- b. All programming and firmware changes must be accomplished on a working system without interruption to the normal operation of the system. Therefore, all system switches and controllers, which hold this firmware and system parameters must have DUAL storage. While updates are being made to one set of firmware, the system must be working and fully functional on the original firmware (i.e. A and B memory blocks). In the event of an error or failure in the update process, the system must revert back to the previous firmware. All security patches must be tested and approved for installation to prevent interruption in service.
- c. All communications must be full duplex audio, not only on handsets, but all loud speaking devices, including patient, staff, duty, and master stations.
- d. Entire Network must be supervised, monitored, patched, maintained, and life-cycled including all sub-stations. Reporting of station failure must be to any designated console, PC, e-mail, or wireless device. Remote diagnostics must be utilized to quickly locate the source of the

problem. Provide network monitoring tool to ensure network reliability. Coordinate requirements with the Government.

- e. Minimum [99][_____] different event types may be defined within the nurse call network to facilitate work flow within and outside of normal nurse call activity (i.e. environmental services, facilities, transportation, lab, pharmacy, etc.).
- f. Nurse call network must be a separate LAN from other hospital networks, but capable of interfacing to the facility network. Match switches, servers, and all other network hardware and tools required for the nurse call system to the facility standard. Verify facility standard with using services.
- g. The nurse call network must not utilize any of the facility network assets to accomplish any of the standard nurse call functions.
- h. The nurse call network must support at least [990][_____] call processes to facilitate work flow and call escalations to various staff and or groups.

2.1.1.8.1 PC Master Station

- a. Provide a PC console display and PC that meets the system manufacturer's minimum specifications, whether it utilizes touch screen or standard mouse control. PC must be coordinated with and approved by using services. When a PC is "associated" with a VoIP console, it must have full interoperability to provide user with easy to follow on screen functions, such as display of call priority, room and patient information. Selecting a touch point or by mouse click must provide an automated service reminder. While in audio contact with the patient, an enriched display must show all user defined display information, such as caregiver assigned, and pertinent patient information.
- b. Display calls on the master station in order of their priority and in the order of when the call was placed.
- c. Provide the following additional functions at each one of these users' screens:
 - (1) Full display of all calls, including corridor light color sequence.
 - (2) Complete electronically generated census of patients showing assigned caregiver, current patient needs as sent by service reminder process, time patient has been waiting for call answering, or need, list of caregivers on duty and staff location.
 - (3) Ability to text message to multiple devices such as pagers, wireless phone displays, handsfree devices, and personally assignable communication devices.
 - (4) Ability to display calls in a centralized display format (i.e. Centralized Code Blue display).
 - (5) Ability to display and route calls in a de-centralized workflow environment.
 - (6) Ability to display all staff information, staff status, wireless extension and their location.

2.1.8.2 Nurse Call Controllers

NOTE: Coordinate number of audio channels with facility design to provide adequate non-blocking communication. A nurse call network reporting to a single station would require only one audio channel as only one call can be answered at a time. A facility using wireless phones to respond to calls would require as many channels as expected simultaneous calls to the handsets. The number of answering devices will dictate the required number of audio channels.

- a. Furnish as needed in each nursing unit or service with an audio-visual system, a nurse call network controller. Each controller must provide the following:
- (1) Non-blocking, duplex communications between consoles and rooms, duty stations, staff stations, sub stations, and master stations.
 - (2) Cabling utilizing PoE (Power over Ethernet) between console and nurse call controllers and local wiring to power room station equipment and dome lights.
 - (3) VoIP audio to Nurse Call Network, VoIP Nurse Console, VoIP staff terminal, wired or wireless phones via SIP protocol. VoIP digital audio stream out to rooms without IP overhead signaling.
- b. Controller must be life safety grade meaning that it does not require regular rebooting for continued basic functions of system and it must be possible for controller to act as a stand alone controller should loss of network communication occur. PCs may not be used for this purpose. PCs will only be allowed outside of the UL-listed nurse call network on the customer supported LAN.
- c. Nurse call controller(s) are connected to the nurse call LAN via Ethernet switches.

2.1.9 Integration

NOTE: Coordinate systems to be integrated with UFC 4-510-01 and appropriate organization/using service. Each system integrated will add cost and difficulty in achieving the goals of the RMF process.

NOTE: Radio page integration is for existing facilities with radio paging. Radio paging is not to be provided in new facilities.

Compatibility: System must be agnostic and non-proprietary and integrate with [specified][existing] [wireless/telephone network/handsfree/personally assignable communication device][,] [staff locating system][,][equipment

tracking system][,] [CCTV][,] [hospital grade televisions][,] [Admit discharge and transfer system][,] [patient entertainment system][,] [infant protection system][,] [radio page][,] [electronic medical records/electronic health records system][,] [patient education system][,] [access control system][,] [lighting control system][,] [shade control][,] [temperature control][,] [and] [fire-alarm system]. Provide middleware that allows for system integration and provides for interoperability of other systems as required.

2.2 MATERIAL AND EQUIPMENT

NOTE: Refer to UFC-4-510-01 for operation of devices and required locations.

2.2.1 Bed Interface Outlet Station

37-pin receptacle, with dummy plug and stainless steel wall plate, to allow calls and auxiliary functions from the bed rails to be annunciated on the nurse call system.

2.2.2 Patient Station - Single Audio

NOTE: Keep second paragraph of Patient Stations for systems where the patient station rather than the dome light functions as the hub for the devices in the patient room.

- a. Call placed lamp, reset pushbutton, speaker/microphone, and polarized receptacle matching cord set plug, mounted in a single faceplate.
- [b. Supports up to [13][_____] call in stations, [3][_____] of which can have audio capability. Provides annunciation of associated console, and visible annunciation at device, of calls originating from connected stations.

]2.2.3 Central Code Annunciation Station

Provides central annunciation of code calls from any code station.

2.2.4 Dummy Plugs

NOTE: Certain manufacturers no longer require dummy plugs to prevent cord detached alarms. These systems generally rely on pushing the cancel button after a cord is removed to acknowledge the cord removal was intentional.

Plug matching receptacle configuration to prevent alarms when cord sets or bed is detached from nurse call system.

2.2.5 Cord Sets

2.2.5.1 Cord Set - Push-Button

Plug and 1828 mm 72-inch white cord; resistant to medical gas environment equipped with momentary-action, call button switch; sterilizable; washable cord.

2.2.5.2 Cord Set - Geriatric Call-Button

Plug and 1828 mm 72-inch white cord; resistant to medical gas environment equipped with momentary-action, light-pressure switch in soft outer jacket; sterilizable; washable cord.

2.2.5.3 Cord Set - Squeeze-Bulb Switch

Plug and 1828 mm 72-inch washable tube with white cord set; resistant to medical gas environment; washable; equipped with neoprene squeeze bulb activator and plug-mounted momentary contact switch; sterilizable.

2.2.5.4 Cord Set - Breath Call Cord

Flexible PVC jacketed cable a a momentary contact air-pressure sensitive switch. Cord must be 2743 mm 108-inches long. An adjustable arm must be included for clamping and suitable for use in oxygen atmospheres. Include 12 replacement straws.

2.2.5.5 Cord Set - Pillow Speaker

Eight-conductor, DIN, flexible PVC jacketed cable. Contains nurse-call button, volume control, speaker, and channel control in molded flame-retardant ABS housing. Cord must be 2438 96-inches long with sheet clip.

2.2.6 Cancel Station

**NOTE: Cancel Station must be located in same space
as the originating station.**

Cancel button, with flexible programming for cancellation of some or all call priorities, mounted in a single faceplate.

2.2.7 Code Blue Station

Call station with the ability to place a code call. Station must have a call assurance LED [and a cancel button].

2.2.8 Domeless Controller

Supports up to [13][_____] call in stations, [3][_____] of which can have audio capability. Provides annunciation at the associated console of calls originating from connected stations.

2.2.9 Dome Light

NOTE: Keep the first paragraph of the Dome Light

**section for systems where the domelight functions as
the hub for the devices in the patient room.**

- [a. Supports up to [13][_____] call in stations, [3][_____] of which can have audio capability. Provides annunciation of associated console, and visible annunciation at device, of calls originating from connected stations.
-] [a][b]. [Four][_____] segment light with integral tone device where each segment must be capable of indicating a call in [white,] [blue,] [red,] [green,] [orange,] [yellow,] [and] [pink]. The colors, patterns, and flash rates of the LED indicator lights must be fully programmable.

2.2.10 Duty Station

Provides visual and audible notification of calls. Contains [4][_____] LEDs to provide visual indication by mimicking dome light display.
[Contains call-in button and speaker/microphone.]

2.2.11 Equipment Alarm Station

[Two][_____] isolated inputs for auxiliary alarms with call assurance LEDs and cancel button compatible with 6 mm 1/4 inch jack medical instruments. Inputs must be supervised to initiate a call if a cord is removed.

2.2.12 Nurse Call Control Cabinet

Wall mounting cabinet providing mounting location for nurse call system head end equipment including power supplies, battery backup, [Ethernet switch,] and other ancillary equipment.

2.2.13 Nurse Call - Lighting Interface

NOTE: The 1 level selection is for on/off control of a single light. The 2 level selection is typically used for a reading/ambient/exam light. Coordinate with lighting controls to ensure intended functionality is present. Most nurse call systems will provide momentary contact inputs into the lighting control system rather than controlling the lights directly.

Provide [1 level][2 levels] [full range dimming of [_____] zones] of lighting from the pillow speaker or bed rail.

2.2.14 Nurse Call - TV Interface

Provides control of hospital grade TV, including power, channel selection, channel up/down, volume up/down, closed caption, and mute from the pillow speaker or bed rail.

2.2.15 Nurse Desk Console

Desk-mounted console providing complete information concerning incoming calls including: patient or staff member's room location, bed (if applicable), call priority, and length of time call has been waiting. An

operator may selectively answer any of three calls displayed or scroll through a list using the key pad for call selection. A call may be answered using the handset for semi-private conversation or the Push-to-Talk key for a hands-free conversation. The console can be configured for user coordinated functions including setting/review service requirements, emergency call upgrade, day/night tones, staff flow, sequential room monitor, swinging groups of rooms, etc. These functions are activated using selector buttons. Functions are customizable on an individual basis allowing each console to be programmed for its specific location and purpose. The console is continually supervised for both power and signal.

2.2.16 Pull Cord - With Audio

NOTE: Pull cord with audio stations are typically used in inpatient restrooms, ED restrooms, etc., but are available from limited manufacturers. Only provide if requested by and coordinated with the using department. Remove pull cord with audio for projects seeking competitive bids.

An emergency call device activated by pulling its cord. The cord must have a pendant attached to the end of the cord and extend to within 50 mm 2 inches of the floor. Provide with [second unique call-in prior button] call assurance LED, cancel button, and speaker/microphone.

2.2.17 Pull Cord

An emergency call device activated by pulling its cord. The cord must have a pendant attached to the end of the cord and extend to within 50 mm 2-inches of the floor. Provide with [second, unique call-in priority button] call assurance LED, and cancel button. Station installed in wet areas must be water resistant.

2.2.18 Staff Emergency Station

Call station with the ability to place a staff emergency call. Station must have a call assurance LED[and a cancel button].

2.2.19 Staff Station

Provides two-way intercom capability. Provide with call button, call assurance LED, [cancel button,] and speaker/microphone mounted in a single faceplate.

2.2.20 Staff Terminal - Graphic Display

Touch screen device with a minimum of 50 programmable functions. Device must be programmable to initiate any of the call functions of the nurse call system, as well as display complete information on incoming calls. Provide with color touchscreen, microphone/speaker, call assurance LED, and cancel button mounted in a single faceplate.

2.2.21 NCTV Annunciator

Provide tone-visual annunciation of calls, service requests, and staff registration, and be able to display events from any device in the nurse

call system network. Call-in priorities are differentiated through unique tone signals and call-in LED flash patterns. Tone may be muted at annunciator, but must automatically re-engage if another call is received.

2.2.22 Zone Light

Provide audiovisual indication of calls by mimicking associated dome light tone, patterns, and flash rates.

PART 3 EXECUTION

3.1 INSTALLATION

NOTE: This guide was prepared for use in preparing project specifications primarily for new building construction. The guide should be modified as appropriate if used for a remodeling or retrofit type project. In retrofit projects, the designer should become familiar with as-built conditions, and maximize the use of existing conduits and raceway components to the practical extent. Use extreme care in retrofit specifications to avoid proprietary statements. Add specifications to provide for repair of existing areas that are disturbed by the retrofit. Show additional drawing details sufficient to allow the prospective contractor to bid all aspects of the job.

Provide a complete and operational nurse call system, with subsystems, to satisfy the specified performance. Install equipment and accessory items to suit manufacturer's instructions and recommendations, plans and specifications. Provide insulated conductors in electrical metallic tubing and cable tray as the wiring method. Installation must comply with the requirements of NFPA 70, NFPA 99, and TIA-569.

3.1.1 Equipment Installation

NOTE: Nurse call headend equipment typically located in Computer Room CMP01.

- a. Where nurse call is provided in behavioral health rooms, provide tamper-proof screws, pushbutton devices, ceiling mount speakers, the ability to secure the nurse call devices, and the ability to mute calls from the master station.
- b. Appropriate waterproof gaskets must be used for station installations in wet areas, such as toilet rooms and showers.
- c. Surface mount Main Terminal/Equipment Panels to the telecommunications rooms indicated. Mounting of those panels in any other room, area or above-finished ceilings is not acceptable. Mark panels with the NC Subsystem number and function served.
- d. The system LAN, server, and UPS equipment housed in telecommunications rooms must be [rack][cabinet] mounted. Under no circumstances can any

of this equipment be mounted on the floor. Telecommunications room physical and security controls must meet the cybersecurity requirements in DODI 8500.01 and DOD 8510.01.

- e. Master Station equipment that does not require attendant access for programming or call activities (such as the CPU and UPS) may be wall mounted in a protected area under the counter top at the master station location. If the under counter mounted equipment can be kicked and damaged by staff sitting at the counter, then a protective shield must be provided for the equipment.
- f. Firmly secure mounted equipment in place, plumb, square, and level.
- g. Provide adequate equipment ventilation and adequate equipment accessibility for service and repair.
- h. Mount dome lights and zone lights so that they are visible for the entire length of the corridor or room in which they are installed.
- i. Incorporate facility's final room naming convention and room numbering.

3.2 FIELD QUALITY CONTROL

3.2.1 Periodic Inspection and Testing

All work and workmanship is subject to inspection and testing as requested by the Contracting Officer at any and all times during preparation and installation. The Contracting Officer, in his or her sole discretion, may reject defective work and workmanship and require its correction. The Government's right to inspect, test, and reject, or its failure to exercise such right, as provided herein, in no way diminishes the system Contractor's duty to inspect and reject work as necessary to comply fully with the requirements of the contract documents.

3.2.2 Final Inspection and Acceptance Testing

Engage a factory-authorized service representative to inspect, test, and adjust components, assemblies, and equipment installations, including connections.

3.2.2.1 Acceptance Testing

- a. Acceptance tests of the installed system must be [phased] in accordance with the project [phasing] schedule.
- b. After installation [for each phase] has been completed, and the system components installed [during the phase] have been completely inspected and checked out, conduct acceptance tests in accordance with the approved Acceptance Test Plan. Submit step-by-step actions and the expected results to demonstrate system compliance with the requirements of this specification. Include tests defined in the Manufacturer's installation instructions; list of all test equipment to be used, including data indicating that calibration of the test equipment is current; test data sheets; and names and qualifications of the person(s) who will perform the tests. Submit all display configurations to Contracting Officer for approval.
- c. Operational Test: Perform an operational system test and demonstrate proper operations as defined in UL 1069, adjustment, and sensitivity of

each station. Test each station capable of originating calls by activating a call from the station and observing the proper sequence of operation. For stations capable of placing multiple types or priorities of call, each call type and priority must be demonstrated. Perform tests that include originating station-to-station messages and pages at each nurse-call station. Verify proper routing, volume levels, and freedom from noise and distortion. Simulate power outage to demonstrate operation on UPS and transition to the essential electrical system. Test each available message path from each station on the system. Meet the following criteria:

- (1) Speaker Output: 90 dB plus or minus 3 dB, 300 to 3000 Hz, reference level threshold of audibility 0 dB at 0.02 mPa of sound pressure.
- (2) Gain from patient's bedside station to nurse station, with distortion less than 65 dB (plus or minus 3 dB, 300 to 3000 Hz).
- (3) Signal-to-Noise Ratio: Hum and noise level at least 45 dB below full output.

d. Test Procedure:

- (1) Frequency Response: Determine frequency response of two transmission paths by transmitting and recording audio tones.
- (2) Signal-to-Noise Ratio: Measure the ratio of signal to noise of the complete system at normal gain settings using the following procedure: Disconnect a speaker/microphone and replace it in the circuit with a signal generator using a 1000-Hz signal. Measure the ratio of signal to noise and repeat the test for four speaker microphones.
- (3) Distortion Test: Measure distortion at normal gain settings and rated power. Feed signals at frequencies of 300, 400, 1000, and 3000 Hz in to each nurse-call equipment amplifier, and measure the distortion in the amplifier output.
- (4) Integration: Demonstrate functionality of each system integrated with the nurse call system.

- e. Inspection: Verify that units and controls are properly labeled and interconnecting wires and terminals are identified. Verify that the system and individual devices are installed in accordance with manufacturer's instructions.
- f. Notify the Contracting Officer when the installation of a system is completed and operating in accordance with specifications and ready for final inspection and acceptance testing.
- g. Submit as-built system drawings in accordance with Section 01 78 00.
- h. Demonstrate proper installation and performance [of each phase] of the system in full compliance with all contract documents.
- i. Upon successful completion of [all phased] final acceptance tests, and 30 calendar days of consecutive operation in accordance with specified requirements without the occurrence of any major malfunctions, submit the final acceptance test report, including certificates of compliance

stating that all specified requirements and conditions have been satisfied. Submit test reports in both electronic media form and hard copy booklet form. Test reports must indicate all field tests performed to adjust each component and to prove compliance with the specified performance criteria. Each test report must indicate the final position of controls and operating mode of the system, and the Manufacturer, model number, and serial number of the test equipment used in each test. The effective date for completion of the final system acceptance must be the date when the system has satisfied the 30 days of operation without a major malfunction as specified above.

3.2.2.2 Corrective Action for Rejected Work

Rectify deficiencies indicated by tests and completely retest work affected by such deficiencies at Contractor's expense. Verify, by the system test, that the total system meets these Specifications and complies with applicable standards. Report results in writing.

3.2.2.3 Warranty Period Inspection and Testing

At the end of 3rd and 7th months of operation, the system Contractor must, at no cost to Government, observe the system in operation and conduct tests to assure that the system is performing as specified. Include interviews of users to determine if the system is satisfying specified requirements and that training is adequate. Coordinate this service with the Contracting Officer. During the 11th month of operation conduct an inspection and test of the system to identify and correct any deficiencies before the end of warranty period. A medical facility representative must witness this procedure and the system Contractor must certify that all necessary corrective actions have been taken. Submit results of each warranty period inspection and test to the Contracting Officer. Submit inspection and testing plan, including contact information and dates of proposed inspection prior to final system acceptance.

3.2.3 Training

[Engage a factory-authorized service representative to train] [Train] Owner's maintenance personnel and caregiver staff to adjust, operate, and maintain nurse-call equipment. Provide training for each role assignable in the nurse call system. Coordinate number of roles with using services. Provide minimum two training sessions for system users and minimum two training sessions for maintenance personnel scheduled to accommodate shift work. Eleven months after the system is installed, provide a refresher course for each group of trainees.

3.3 MAINTENANCE

Submit Data Package 5 operation and maintenance data for the installed nurse call system in accordance with Section 01 78 23 OPERATION AND MAINTENANCE DATA.

- a. System must be compatible with and utilize the most current Government approved operating system authorized for use on servers and workstations. Coordinate with Government to establish a plan of action for approval and dissemination of required Information Assurance Vulnerability Alert (IANVA) patches as well as software and security updates. All licenses for the nurse call system must be perpetual licenses.

- b. Technical Support: Beginning with Substantial Completion, provide software support for [two][____] years. Contractor must follow the DHA Business to Business (B2B) process, or other process as coordinated with the using services to provide connectivity to support remote repair, maintenance, and sustainment of the system.
- c. Upgrade Service: Update software to latest version at Project completion. Install and program software upgrades that become available within [two][____] years from date of Substantial Completion. Upgrading software must include operating system. Upgrade must include new or revised licenses for use of software. Upgraded software must meet requirements of the RMF and may require recertification of the system.

Provide [30] [____] days notice to Owner to allow scheduling and access to system and to allow Owner to upgrade computer equipment if necessary.

-- End of Section --