
NAVFAC IGS-16822 (April 2003)

Preparing Activity: LANTNAVFACENGCOM Based on UFGS-16822

ITALIAN GUIDE SPECIFICATIONS

Use for ITALIAN projects only

SECTION 16822

INTERCOMMUNICATION SYSTEM

04/03

NOTE: This guide specification is issued by the Atlantic Division, Naval Facilities Engineering Command for regional use in Italy.

NOTE: This guide specification covers the requirements for four different types of intercommunication systems, one of which shall be selected for the project. (For brig facilities, Type 1 shall be selected for the station to station intercommunications and Type 5 shall be specified for the public address and monitoring function for the project.) The various types are as follows:

1. Type 1: Direct connected, keyed system: This type of system is applicable for relatively small systems (maximum quantity of remote stations approximately 30) and generally when only a small number of master stations (usually 1 or 2) are required. However, if there is a requirement for annunciation at more than one location or a requirement for multiple conversation paths the use of this system with more than 1 or 2 master stations or with many more than 30 remote stations may be justified or required.
2. Type 2: Single conversation path, central control system: This type of system is applicable to relatively large systems (more than approximately 30 stations) where only one conversation path is required and usually only one master station. This type of system is applicable to BEQs.
3. Type 3: Multiple conversation paths, central control system: This type of system is applicable to various size systems where a large portion of the total quantity of stations are master stations. A

limited quantity of conversation paths may be specified as required.

4. Type 4: Paging system: This type of system provides one-way communications, using conventional public address system components. By proper inclusion of radio components it applies to radio paging.

5. Type 5: The Type 5 system has been omitted from this specification. UFGS-16822N includes this system for a public address and monitoring system (for brigs): This type of system provides two-way paging and monitoring communications, using conventional public address system components. If this type of system is required, the specifier shall develop this specification.

Comments and suggestion on this specification are welcome and should be directed to the technical proponent of the specification. A listing of the technical proponents, including their organization designation and telephone number, is on the Internet.

Use of electronic communication is encouraged.

Brackets are used in the text to indicate designer choices or locations where text must be supplied by the designer.

NOTE: Require shop drawings to supplement or clarify contract drawings. Contract drawings should clearly indicate approximate locations of all stations, conduit, and junction boxes. State precisely in the project specifications what is to be shown in detail drawings. If contract drawings do not show the locations of master stations, remote stations, junction boxes, and other system components, then the number and type of stations, junction boxes, and the distance between them shall be included as a part of the contract specifications.

The guide specification covers intercommunication system and lists desirable features of electronic systems; however, not all manufacturers produce products with all the listed features. Manufacturers catalogs should be consulted for the features required. Where intercommunication systems are to be used with other communication devices, consideration must be given to the electromagnetic capability of the intercommunication system. This intercommunication system guide specification does

not include all features and design parameters which are available. However, specifying equipment configuration or design parameters which are unnecessarily restrictive to competition should be avoided.

PART 1 GENERAL

1.1 REFERENCES

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

AMERICAN NATIONAL STANDARDS INSTITUTE (ANSI)

ANSI S3.2 (ASA 85) (1989; R 1995) Measuring the Intelligibility of Speech Over Communication Systems

EUROPEAN STANDARD (EN)

NOTE: An EN is a European Standard established on the principle of consensus and adopted by the votes of weighted majority of the members of the European Standards Committee. Adopted standards must be implemented in their entirety as National Standards, regardless of the way the national member voted, and any conflicting national standards must be withdrawn. Available in the English language.

CEI EN 50086-1 (1997) Conduit Systems for Electrical Installations - Part 1: General requirements

CEI EN 60268-3 (2001) Sound System Equipment - Part 3: Amplifiers

CEI EN 60268-4 (2000) Sound System Equipment - Part 4: Microphones

CEI EN 60423 (1996) Conduits for electrical purposes - Outside diameters of conduits for electrical installations and threads for conduits and fittings

CEI EN 60529 (1997; A1 2001) Degrees of protection provided by enclosures (IP Code)

ITALIAN ELECTROTECHNICAL COMMITTEE STANDARDS (CEI)

NOTE: A CEI Norm is an Italian technical normative for electrical systems recognized by Italian Law, submitted by a private organization "Comitato Elettrotecnico Italiano" for the Italian territory, available in the Italian language and only in some cases in English.

- CEI 20-20 (1990) Polyvinyl Chloride Insulated Cables of Rated Voltages up to and Including 450/750V.
- CEI 20-22/2 (1995; V1 2001) Test on Electric Cables under Fire Conditions - Part 2: Fire Propagation
- CEI 20-38/1 (1997) Fire retardant power cables with low emission of smokes and toxic corrosive gases, rubber insulated - Part 1 - Rated voltage U₀/U not exceeding 0,6/1 kV
- CEI 29 (1990) Vocabulary of electro-acoustics
- CEI 64-8 (1998; V1 2001; V2 2001) Electrical installations of buildings
- CEI 81-1 (1998) Lightning Protection of Structures
- CEI 84-9 (1997) Conference Systems - Electrical and Audio Requirements

1.2 RELATED REQUIREMENTS

Section 16050, "Basic Electrical Materials and Methods," applies to this section, with the additions and modifications specified herein.

1.3 SYSTEM DESCRIPTION

NOTE: Delete paragraph and subparagraph if Type 4 is specified.

1.3.1 Performance Requirement for Type [1] [2] [3] System

Solid state, modular in design, and shall be of the [wired] [and] [wireless] type with [all master stations] [a single master with remote stations] [master and remote stations intermixed]. [Station shall have capacity for later expansion to [____master] [and] [____remote] stations [with____handset] without sacrificing any equipment or feature performance]. [When both wired and wireless circuitry is used, such interface shall not reduce function or quality].

1.3.1.1 Sound Reproduction

The intercommunication system shall reproduce at all receiving stations a 30 dB dynamic range of a 40 dB minimum input signal referenced to sound pressure level (SPL) over the frequency range of [300] [_____] to [3300] [_____] Hz. Unless otherwise specified, SPL shall be 20 micro Pascal (0.00002 Newtons per square meter). The root-mean square (rms) extraneous noise (e.g. hum) level introduced by the intercommunication system shall be at least [30] [_____] dB below the nominal signal level. Distortion, including envelope delay, intermodulation, cross talk, and other nonlinear source, shall not exceed 5 percent.

1.3.1.2 System Performance

Provide system with normally acceptable speech intelligibility, defined as a score of at least 75 percent obtained utilizing the phonetically balanced monosyllabic word intelligibility test in accordance with ANSI S3.2 (ASA 85).

1.3.1.3 System Operation and Service Features

- a. Provide the system with a power switch and an associated pilot light for ON and OFF operations. Include a volume switch at each station to regulate listening volume. Unless otherwise specified, the system shall operate on 220 Vac, single phase, 50 Hz source.
- b. All master stations shall have a "call-in" switch to provide an audible and visual indication of incoming calls from remote station. Individual visual indication shall identify calling station and status, and remain actuated until a call is answered by a master station.
- c. In addition to the manufacturer's standard identification plates, provide engraved laminated phenolic identification plates for each component connection and terminal identification labels, and shall be 3-layer black on white on black, engraved to show white letters on black background. Warning or caution labels shall be 3-layers red on white on red, engrave to show white letters on red background. Control switches and knobs shall be clearly marked with their function and status. Identification strips for station selector switches shall be located to clearly identify remote and master stations and shall be protected by transparent plastic inserts. Lettering shall be a minimum of 6.35 mm high, normal block style. Nameplates shall be in English language.
- d. At speaker/handset stations, lifting the handset shall automatically cut out the loudspeaker in the station and all conversation shall be carried through handset.

NOTE: Regarding the text below, where noise does not exceed 55 dB, specify hands-free operation from distances up to 6100 mm. In areas where the noise occasionally exceeds 55 dB, a talk-listen switch

which overrides the hands-free operation should be specified. Where a high noise environment exists, delete hands-free operation and specify only a talk listen switch.

- e. A privacy switch shall be provided at each remote station. In the ON position, the switch shall prevent any transmission of sound from the remote station. When in the OFF position, without further switch manipulation, the station shall respond to incoming calls upon voice activation from anywhere within 6100 mmradius of station.

1.4 OPERATION

1.4.1 Background Music

Background music shall initiate from either an FM tuner or from a continuous load type magnetic cassette tape and shall feed all speakers during normal operation. Background music shall be continuous to speakers but shall automatically cut off speakers during paging functions.

1.4.2 Paging Announcements

Paging announcements may be initiated from the telephone system by dialing an appropriate code from any telephone instrument. Paging up to five zones as well as a separate all page zone shall be provided. Cross-talk between user line shall not be permitted.

1.5 SUBMITTALS

NOTE: Submittals must be limited to those necessary for adequate quality control. The importance of an item in the project should be one of the primary factors in determining if a submittal for the items is required.

Where a "G" in submittal tags follows a submittal item, it indicates Government approval for that item. Add "G" in submittal tags following any added or existing submittal items deemed sufficiently critical, complex, or aesthetically significant to merit approval by the Government. Submittal items not designated with a "G" will be approved by the QC organization.

Submit the following in accordance with Section 01330, "Submittal Procedures."

SD-02 Shop Drawings

Intercommunication system

Submit drawings that clearly and completely indicate the function of each component. Indicate termination points of devices, and interconnections required for system operation. Indicate interconnecting between central unit and devices. In addition, submit a layout drawing showing spacing of components, location, mounting and positioning details. Provide marking of every device and cable with a distinctive number at each end and at every access point or terminal board to facilitate the installation of equipment and facilitate troubleshooting. Provide an overall system schematic indicating relationship of intercommunication units, on one diagram, identifying type, size, and number of wiring, conduits, power source, systems controls, impedance matches, and each major component.

SD-03 Product Data

Materials and equipment for Type [1] [2] [3] system

[Paging system equipment]

Cables and raceways

Surge protection

AM/FM equipment

Cassette tape equipment

Switches and controls

Equipment racks

SD-05 Design Data

Amplifier power capacity calculation

SD-07 Certificates

Operational Test Plan

Instructor's Qualification Resume

Training Plan

SD-10 Operation and Maintenance Data

Intercommunication system, Data Package 5

Submit operation and maintenance data in accordance with Section 01781, "Operation and Maintenance Data."

1.6 QUALITY ASSURANCE

1.6.1 Operational Test Plan

Submit at least 30 days prior to commencement of formal operational testing. Include detailed procedure for operational testing of each component and subsystem, and for performance of an integrated system test.

1.7 DELIVERY AND STORAGE

Equipment placed in storage until installation time shall be stored with protection from the weather, humidity and temperature variations, dirt and dust, and other contaminants.

PART 2 PRODUCTS

2.1 SOURCE MANUFACTURERS

2.1.1 Type 1, Type 2, Type 3 System

The following manufacturers provide master stations and remote stations for intercommunication systems that generally comply with these specifications:

BPT in Italy:

LAZIO

CANCELLIERI & AVITABILE snc

Via Ludovico di Breme, 21

00137 Roma (RM)

Tel: 06-8680-2233

Fax: 06-824236

www.bpt.it

COMELIT GROUP S.p.A.

24020 Rovetta

S. Lorenzo (Bergamo)

Tel: 0346-72180

Fax: 0346-71436

www.comelit.it

AI PHONE

LA COMMERCIALE ITALIANA

Via Risorgimento 10/A

25050 Rodengo Saiano

Tel: 30-681-0327

Fax: 30-681-0337

www.aiphone.com

2.1.2 Type 4 System

The following manufacturers provide master stations and remote stations for intercommunication systems that generally comply with these specifications:

RADIO CINE FORNITURE S.p.A.

Via G. Ferraris, 2

42029 San Maurizio (Reggio Emilia)

Tel: 552-345111

Fax: 522-551875
web.tin.it/rcf

PASO S.p.A.
Via Mecenate, 90
20138 Milano
Tel: 02-58077-1
Fax: 02-58077-277
www.paso.it

2.1.3 Page Control/Telephone Interface Module

The following manufacturers provide page control/telephone interface module equipment for paging systems that generally comply with these specifications:

SAMSUNG ELECTRONICS ITALIA S.p.A.
Via C. Donat Cattin, 5
20063 Cernusco sul Naviglio (MI)
Tel: 02-92189-1
Fax: 02-92141-801
www.samsung-italia.com

ADEMCO ITALIA S.p.A.
via Della Resistenza N 53/59
20090 Buccinasco (MI)
Tel: 02-4571-791
Fax: 02-4570-1034
www.ademco.com

2.1.4 Cables

The following manufacturers provide speaker cable and microphone cable for intercommunication and paging systems that generally comply with these specifications:

PIRELLI CAVI E SISTEMI S.p.A.
Viale Sarca, 222
20126 Milano
Tel: 02-6442-1
Fax: 02-6442-9264
www.pirelli.com

NEXANS
CAPIATI D. s.a.s. (Industrial Representative)
Via Pigorini, 24
00162 Roma
Tel: 06-4423-5721
Fax: 06-4423-6338
www.nexans.it

2.1.5 Surge Protection

The following manufacturers provide surge protection devices and signal

surge protection devices that generally comply with these specifications:

CARPANETO & C. S.p.A.
Via Ferrero, 10
10090 Cascine Vica - Rivoli (TO)
Tel: 011-9590-111
Fax: 011-9590-200
www.carpaneto.it

FITRE
Via Valsolda, 15
20142 Milano
Tel: 02-8959-01
Fax: 02-8959-0400
www.fitre.it

2.1.6 Speaker Enclosures

The following manufacturers provide speaker enclosures that generally comply with these specifications:

RADIO CINE FORNITURE S.p.A.
Via G. Ferraris, 2
42029 San Maurizio (Reggio Emilia)
Tel: 552-345111
Fax: 522-551875
web.tin.it/rcf

PASO S.p.A.
Via Mecenate, 90
20138 Milano
Tel: 02-58077-1
Fax: 02-58077-277
www.paso.it

2.1.7 AM/FM Tuner

The following manufacturers provide AM/FM tuners that generally comply with these specifications:

RADIO CINE FORNITURE S.p.A.
Via G. Ferraris, 2
42029 San Maurizio (Reggio Emilia)
Tel: 552-345111
Fax: 522-551875
web.tin.it/rcf

PASO S.p.A.
Via Mecenate, 90
20138 Milano
Tel: 02-58077-1
Fax: 02-58077-277
www.paso.it

2.1.8 FM Antenna

The following manufacturers provide FM antenna's that generally comply with these specifications:

GLOMEX
Via Braille, 12
48100 Ravenna
Tel: 0544-500377
Fax: 0544-500420
www.glomex.it

SIR
via Roma, 72/B
37054 Nogara (VR)
Tel: 0442-510467
Fax: 0442-510480
www.sir.it

2.1.9 Cassette Tape Equipment

The following manufacturers provide cassette tape play decks that generally comply with these specifications:

RADIO CINE FORNITURE S.p.A.
Via G. Ferraris, 2
42029 San Maurizio (Reggio Emilia)
Tel: 552-345111
Fax: 522-551875
web.tin.it/rcf

PASO S.p.A.
Via Mecenate, 90
20138 Milano
Tel: 02-58077-1
Fax: 02-58077-277
www.paso.it

2.1.10 Switches and Controls

The following manufacturers provide background music system control switches that generally comply with these specifications:

RADIO CINE FORNITURE S.p.A.
Via G. Ferraris, 2
42029 San Maurizio (Reggio Emilia)
Tel: 552-345111
Fax: 522-551875
web.tin.it/rcf

PASO S.p.A.
Via Mecenate, 90
20138 Milano
Tel: 02-58077-1

Fax: 02-58077-277
www.paso.it

2.1.11 Equipment Racks

The following manufacturers provide equipment racks that generally comply with these specifications:

QUANTE
TRUCCO S.p.A.
Via Giani 1/3
15045 Sale (AL)
Tel: 0131-844212
Fax: 0131-844265
www.trucco.it

PASO S.p.A.
Via Mecenate, 90
20138 Milano
Tel: 02-58077-1
Fax: 02-58077-277
www.paso.it

2.2 EQUIPMENT AND COMPONENTS

Equipment and components shall conform to applicable requirements of CEI 29, CEI 84-9, CEI EN 60268-3, and CEI EN 60268-4. Units of the same type of the equipment shall be product of a single manufacturer. Units to be mounted outside or subject to inclement conditions shall be weatherproof or be mounted in weatherproof enclosures.

2.2.1 Identical Items

Items of the same classification shall be identical. This requirement includes equipment, modules, assemblies, parts, and components.

2.2.2 Nameplates

Each major component of equipment shall have the manufacturer's name, address, model and catalog number, and serial number on a plate secured to the equipment.

[2.2.3 Type 1 System: Direct Connected Keyed Intercommunication System

NOTE: Select the appropriate paragraph and its following subparagraphs for the features desired. Delete all paragraphs describing unwanted features.

NOTE: The bracketed requirements specified in the paragraph below are based on U.S. products and have been retained from the NAVFAC guide specifications.

There has been no verification of availability of local products in the EFAMED area that meet these specified requirements. For the bracketed requirements to be included in a project specification, such verification shall be made by the designer.

Provide master stations and remote stations in the quantities indicated. Each master station shall selectively communicate with any other master station and any remote station by actuating an appropriate selector switch. [Each master station shall be capable of initiating a message to all other master stations and all remote stations simultaneously or in groups of not less than ten stations per group.]

2.2.3.1 Master Station

[Desk] [surface wall] [recessed wall] [rack]-mounted master stations shall as a minimum conform to the following specifications:

- a. Capacity: Accommodate [_____] stations
- b. Speaker sensitivity: Minimum 1.4 mV/Pa

2.2.3.2 Intercommunication Amplifier

CEI EN 60268-3. Intercommunication amplifier shall as a minimum conform to the following specifications:

- a. Output power: [2] [_____] watts rms or greater
- b. Total harmonic distortion: Less than 5 percent at rated power with a load equivalent to one station connected to output terminals
- c. Signal-to-noise ratio: 60 dB or greater at rated output
- d. Frequency response ratio: Plus or minus 2 dB from [60] [70] [80] Hz to [12000] [15000] [16000] [18000] Hz

2.2.3.3 Remote Station

[Desk] [surface wall] [recessed wall] [rack]-mounted remote station shall have [stainless] [anodized aluminum] faceplate with temper proof mounting screws and [galvanized steel] [aluminum] backbox [with "station call-in" capabilities]. Remote station shall provide a speaker with a minimum sensitivity of 40 dB for speakers less than 200 mm in diameter and 45 dB for speakers 200 mm or greater. Remote station shall have a call announcement monitor lamp [and recurring momentary tone].

2.2.3.4 All-Call Amplifier

NOTE: Include only when it is determined that an all-call feature is an operational requirement.

CEI EN 60268-3. All-call amplifier shall as a minimum conform to the following specifications:

- a. Output power: Minimum of [0.5] [10] [20] [30] [_____] watts for each station
- b. Total harmonic distortion: Less than 5 percent at rated power with a load equivalent to the quantity of stations connected to it in all-call mode of operation
- c. Signal-to-noise ratio: 60 dB or greater at rated output
- d. Frequency response ratio: Plus or minus 2 dB from 50 Hz to 18000 Hz

] [2.2.4 Type 2 System

NOTE: Select the appropriate paragraph and its following subparagraphs for the features desired. Delete paragraphs describing the features not required.

NOTE: The bracketed requirements specified in the paragraph below are based on U.S. products and have been retained from the NAVFAC guide specifications. There has been no verification of availability of local products in the EFAMED area that meet these specified requirements. For the bracketed requirements to be included in a project specification, such verification shall be made by the designer.

Provide single conversation path, central control intercommunication system with a master station, automatic switching equipment, remote stations and [an annunciator panel] and all amplifiers. Master station shall selectively communicate with any remote station by actuating the [two] [three] digit number assigned to that remote station. [Master station shall be designed to communicate with all remote stations simultaneously or in groups of not less than 10 stations by actuating an assigned "all-call" number.] Only the selected remote station shall be able to listen or talk to the master station. A nonselected remote station shall not be able to hear or interfere with any portion of conversation between master station and selected remote station. Hanging up master station handset shall reset system for next call. Quantity and location of remote stations shall be as indicated.

2.2.4.1 Master Station

Provide [desk-top] [rack]-mounted type master station equipped with a handset with a switch for private conversations [with permanently coiled cord, approximately 1525 mm long extended]. Master station shall have molded shock-resistant plastic handset and housing. Housing shall be mounted on a steel base plate with a station selector with ten-digit, silent operating touch key mechanism.

2.2.4.2 Remote Station

Provide [desk-top] [surface wall] [recessed wall] [rack]-mounted remote stations with [stainless steel] [anodized aluminum] face plates with tamperproof mounting screws and [galvanized steel] [aluminum] backbox. [A "call-in" switch mounted on a faceplate to provide selective call-in to master station shall be provided as an integral part of the remote station.] Remote stations shall provide a speaker with a minimum sensitivity of 40 dB for speakers less than 200 mm in diameter and at least 45 dB for speakers 200 mm or greater. Remote stations shall have a call announcement monitor lamp [and recurring momentary tone].

2.2.4.3 Intercommunication Amplifier

CEI EN 60268-3. Intercommunication amplifier shall as a minimum conform to the following specifications:

- a. Output power: [60] [90] [_____] watts rms or greater
- b. Total harmonic distortion: Less than 2 percent at rated output power with a load equivalent to one station connected to output terminals
- c. Signal-to-noise ratio: [55] [65] dB or greater at rated output
- d. Frequency response ratio: Plus or minus 3 dB from [50] [60] Hz to [12000] [15000] Hz

2.2.4.4 All-Call Amplifier

CEI EN 60268-3. All-call amplifier shall as a minimum conform to the following specifications:

- a. Output power: Minimum of [30] [60] [_____] watt rms for each station
- b. Total harmonic distortion: Less than 2 percent at rated output power with a load equivalent to the quantity of stations connected to it in all-call mode of operation
- c. Signal-to-noise ratio: [40] [45] [50] dB or greater at rated output
- d. Frequency response ratio: Plus or minus 3 dB from 50 Hz to 20000 Hz

2.2.4.5 Horn-Type Loudspeakers

**NOTE: Use 57 decibels for axial sensitivity of
bi-directional and compound diffraction horns.**

CEI 29. Horn-type loudspeakers shall be provided with line transformers and mounting brackets and shall as a minimum conform to the following specifications:

- a. Frequency response: Plus or minus 3 dB from [100] [200] [400] Hz to [12000] [13000] [_____] Hz
- b. Power rating: [5] [10] [20] [_____] watts
- c. Horizontal dispersion angle: [0.70] [0.87] [1.05] [1.75] [_____] rad
- d. Vertical dispersion angle: [0.35] [0.70] [1.22] [2.62] [_____] rad
- e. Axial sensitivity: Minimum of [57] [60] [_____] dB
- f. Line transformers power rating: At least [4] [10] [15] watts

] [2.2.5 Type 3 System

**NOTE: Select the appropriate paragraph and its
following subparagraphs for the features desired.
Delete all paragraphs describing features not
required.**

**NOTE: The bracketed requirements specified in the
paragraph below are based on U.S. products and have
been retained from the NAVFAC guide specifications.
There has been no verification of availability of
local products in the EFAMED area that meet these
specified requirements. For the bracketed
requirements to be included in a project
specification, such verification shall be made by
the designer.**

Provide multiple conversation paths, central control intercommunication system capable of communicating with the other master stations and remote stations selectively or in any combination thereof. [Each master station shall selectively communicate with any other master station or remote station by actuating number assigned to initiate a message to all other master stations and all remote stations simultaneously or in groups of not less than 10 stations.] [All call actuation shall also activate all paging speakers.]

2.2.5.1 Master Stations

Provide [desk-top] [surface wall] [recessed wall] [rack]-mounted master stations with ten digit touch key station selector mechanism. Master station shall have a speaker-microphone with at least 40 dB sensitivity. Master station shall also have a push-button type reset button to cancel calls and reset system for next call.

2.2.5.2 Remote Station

Provide [desk-top] [surface wall] [recessed wall] [rack]-mounted remote stations with [stainless steel] [anodized aluminum] face plates with tamper proof mounting screws and [galvanized steel] [aluminum] backbox. [A "call-in" switch mounted on a faceplate to provide selective call-in master station shall be provided as an integral part of the remote station.] Remote station shall provide speakers with a minimum sensitivity of 40 dB for speakers less than 200 mm in diameter and at least 45 dB for speaker 200 mm or greater.

2.2.5.3 Intercommunication Amplifier

CEI EN 60268-3. Intercommunication amplifier shall as a minimum conform to the following specifications:

- a. Output power: [60] [120] [160] [_____] watts rms or greater
- b. Total harmonic distortion: Less than one percent at rated output power with a load equivalent to a load equivalent to one station connected output terminals
- c. Signal-to-noise ratio: [60] [65] [75] [85] dB or greater at rated output
- d. Frequency response ratio: Plus or minus 3 dB from 50 Hz to 15000 Hz

2.2.5.4 All-Call Amplifier

CEI EN 60268-3. All-call amplifier shall as a minimum conform to the following specifications:

- a. Output power: Minimum of [0.5] [_____] watt rms for each station
- b. Total harmonic distortion: Less than one percent at rated power with a load equivalent to [_____] stations connected to output terminal all-call mode of operation
- c. Signal-to-noise ratio: 40 dB or greater at rated output
- d. Frequency response ratio: Plus or minus 3 dB from [50] [60] [80] Hz to [12000] [15000] [16000] Hz

2.2.5.5 Horn-Type Loudspeakers

**NOTE: Use 57 decibels for axial sensitivity of
bi-directional and compound diffraction horns.**

CEI 29. Horn-type loudspeakers shall be provided with line transformers and mounting brackets and shall be as a minimum conform to the following specifications:

- a. Frequency response ratio: Plus or minus 3 dB from 100 Hz to 18000 Hz
- b. Power rating: [20] [25] [30] [_____] watts
- c. Horizontal dispersion angle: [0.70] [0.87] [1.05] [1.75] [_____] rad
- d. Vertical dispersion angle: [0.35] [0.70] [1.22] [2.62] [_____] rad
- e. Axial sensitivity: Minimum of [57] [60] [_____] dB
- f. Line transformers power rating: At least 4 watts

]2.2.6 Type 4 System: Paging System

**NOTE: Select the appropriate paragraph and its
following subparagraphs for the features desired.
Delete paragraphs describing the features not
required. System capacity should include future
expansion requirements.**

**NOTE: The paragraphs below are based on a
combination of a job specification and catalog data
from 2 manufacturers. The designer shall verify the
availability of local products in Italy that meet
these specified requirements.**

Provide paging system including amplifier, preamplifier, control panel, speakers, microphone, and interconnecting cables. All speakers shall operate from a [70] [25] volt distribution system. System shall be solid state, and shall be integrated design of a single supplier. [Paging shall be made from the telephone system through the background music system specified herein. Provide installation of equipment necessary for interface with the telephone system.]

2.2.6.1 Preamplifier/Mixer

CEI EN 60268-3. Provide preamplifier/mixer either separately or as an integral part of power amplifier. If separate, it shall be completely

self-contained, requiring only a 220 Vac power source. Provide controls which are front panel mounted, and include ON/OFF switch with power on visual indicator. Preamplifier shall employ only solid state devices and shall be as a minimum conform to the following specifications:

- a. Inputs: Microphone: Low impedance, [1.3] [2.2] Kohms nominal
- b. Auxiliary: High impedance, [20] [22] Kohms or greater
- c. Signal-to-noise ratio: [50] [65] [80] dB or greater at rated output
- d. Frequency response ratio: Plus or minus 3 dB from 50 Hz to [15000] [16000] Hz
- e. Total harmonic distortion: Less than one percent at rated output power
- f. Output: Shall be sufficient to drive power amplifier to rated output

2.2.6.2 Power Amplifier

CEI EN 60268-3. Provide power capacity calculation to ensure that the total wattage of all connected speakers at the indicated tap values does not exceed 75 percent of the amplifier power rating. Power amplifier shall employ only solid state devices and shall be as a minimum conform to the following specifications:

NOTE: To specify proper power rating of amplifier, allow 1 watt for each cone type speaker and 1.5 watts for each horn type. Special circumstances may dictate greater power requirements.

Provide controls which are front panel mounted, and include ON/OFF switch with power-on visual indicator. Power amplifier shall employ only solid state devices. Performance characteristics:

- a. Power output: [60] [120] [150] [_____] watts or greater
- b. Signal-to-noise ratio: [65] [70] [80] dB or greater at rated output
- c. Frequency response ratio: Plus or minus 3 dB from 50 Hz [15000] [16000] Hz
- d. Total harmonic distortion: Less than one percent at rated output
- e. Power requirements: 220 Vac, 50 Hz

2.2.6.3 Cone Speaker

CEI 29. Provide [ceiling] [wall] [pendant]-mounted cone type speakers. Include rust-proof back boxes of acoustically damped construction, minimum 0.9 mm steel or aluminum; provide for relief of back pressure. Include suitable recessed mounted speaker grille, made of 0.9 mm minimum steel or aluminum. Speaker assembly shall as a minimum conform to the following specifications:

- a. Sensitivity (sound pressure level): Minimum of 90 dB, measured at 1 watt input, 1000 mm on axis
- b. Frequency response ratio: Plus or minus 3 dB from [50] [80] Hz to [12000] [16000] [20000] Hz
- c. Dispersion angle: 0.52 rad or greater
- d. Transformer with 3 level taps: [1/4] [1/2] [1] [2] [5] [10] [15] [_____] watts
- e. Voice coils: 25 mm

2.2.6.4 Horn-Type Loudspeakers

NOTE: Ensure mounting height is indicated on the drawings.

NOTE: The bracketed requirements specified in the paragraph below are based on U.S. products and have been retained from the NAVFAC guide specifications. There has been no verification of availability of local products in the EFAMED area that meet these specified requirements. For the bracketed requirements to be included in a project specification, such verification shall be made by the designer.

CEI 29. Horn-type loudspeakers shall be provided with line transformers, mounting brackets and all hardware, shall be mounted at heights indicated on drawings, and shall as a minimum conform to the following specifications:

- a. Power rating: [10] [15] [20] [30] [_____] watts
- b. Frequency response ratio: Plus or minus 3 dB from 50 Hz to 13000 Hz
- c. Horizontal dispersion angle: [0.70] [0.87] [1.05] [1.75][_____] rad
- d. Vertical dispersion angle: [0.35] [0.70] [1.22] [2.62] [_____] rad
- e. Sensitivity (sound pressure level): Minimum of 90 dB measured at

1 watt input, 1000 mm on axis

- f. Power taps: [1/2] [1] [2] [4] [5] [10] [15] [20] [25] [_____] watts

2.2.6.5 Microphone

CEI EN 60268-4. Provide dynamic omni-directional microphones, [wall-mounted] [desk-mounted with desk stand and touch-to-talk bar]. Include zone selector switches [with indicating lights]. Microphones shall as a minimum conform to the following specifications:

- a. Frequency response ratio: Plus or minus 3 dB from [50] [80] Hz to [12000] [16000] Hz
- b. Impedance: Low impedance, [200] [250] [500] ohms nominal
- c. Output level: 58 [____] dB minimum

[2.2.6.6 Page Control/Telephone Interface Module

Paging shall be accomplished by the building telephone system instruments interconnected to the background music system via an interface module to allow telephone dial up access to the paging amplifier. The interface shall be modular with telephone line input and shall be provided with six zone integrated page control. The system shall be capable of paging by individual zone, group paging and all call. When the telephone line connected to the interface module is activated the interface module shall produce an alert tone in both the telephone and in the associated speaker or group of speakers. The page control/telephone interface module shall meet the following minimum requirements.

- a. Standard Features: Built in single and warble tone generator
- b. Features selectable and programmable per zone
- c. Accept pulse dial and tone dial
- d. Battery back-up power with maintenance free long-life gel cell batteries and battery charger with battery test switch and power-on LED
- e. Access: Electronic or IA2 line key (line card required) PABX loop or ground-start trunk port, or dedicated single-line phone
- f. Input Impedance: 600 ohm
- g. DC Output: 24VDC at 1.5 Amps
- h. Power Requirements: 220 V a.c., 50 Hz

]2.3 CABLES AND RACEWAYS

Cable and raceways shall conform to CEI 20-20, CEI 20-22/2, CEI EN 60423,

and CEI EN 50086-1. Cabinets and boxes shall conform to CEI EN 60529. Cables for use in air plenums shall be classified low smoke and low flame in accordance with CEI 20-38/1.

2.3.1 Speaker Cable

Provide basic cables conforming to CEI 20-20 and CEI 20-38/1 single twisted pair shielded cables, 1.5 sq. mm, stranded tinned copper with vinyl insulation aluminum polyester shield, stranded tinned copper wire with overall vinyl jacket. Multi-conductor shielded pair cables conforming to basic speaker cable specifications are acceptable.

2.3.2 Microphone Cable

Cable shall be CEI 20-20 and CEI 20-38/1 single conductor shielded cable stranded copper, 1.5 sq. mm, rubber insulated, tinned copper shield and rubber overall jacket.

2.4 TERMINALS

Terminals shall be [solderless, tool-crimped pressure] [or] [_____] type.

2.5 SURGE PROTECTION

2.5.1 Power Surge Protection

Major components of the system such as master stations, amplifiers, mixer-preamplifiers, [tuners,] and remote stations, shall have a device, either internal or external, which shall provide protection conforming to CEI 81-1, against voltage spikes and current surges originating from commercial sources.

2.5.2 Signal Surge Protection

Major components of the system shall have internal protection circuits which protect the component from mismatched loads, direct current, and shorted output lines.

2.6 SPEAKER ENCLOSURES

Speaker enclosures shall be compatible with the speakers specified and shall comply with CEI EN 60529.

2.7 AM/FM EQUIPMENT

2.7.1 AM/FM Tuner

AM/FM tuner shall be rack-mounted and shall as a minimum conform to the following characteristics:

Tuning Range:	AM - 522 to 1620 kHz
	FM - 87.5 to 108 MHz
Selectivity:	60 dB on FM

40 dB on AM

Sensitivity: FM - 10 microvolts
 AM - 1.0 millivolts

Capture Ratio: 1.0 dB

Power Requirement: 220 Vac, 50 Hz

2.7.2 FM Antenna

The FM antenna shall be roof-mounted, and shall cover all frequency bands specified for the FM radio tuners. The antenna shall be supported at least 1524 mm clear above the roof by means of self-supported mast. The system shall be furnished complete with a transformer, insulators, crossover insulator, 75 ohm coaxial cable of proper length, lightning arresters and coupling transformer. Attenuation of the coaxial cable span between the antenna and tuner shall not exceed 2.5 dB at 108 MHz.

2.8 CASSETTE TAPE EQUIPMENT

The dual cassette tape play deck shall as a minimum conform to the following specifications:

Frequency Response: Plus or minus 3 dB, [20] [40] [50] [125] -
 [6300] [14000] [18000] [20000] Hz

Wow and Flutter: Less than [0.05] [0.09] percent WRMS

Signal-to-Noise: [50] [64] dB

Distortion: 1.3 percent maximum

Play Head: Hard Parmalloy

Operation: Automatic Reverse

Power Requirements: 220 Vac, 50 Hz

2.9 SWITCHES AND CONTROLS

2.9.1 Background Music System Control Switch

The coil in the loudspeaker or group of loud speakers in selected rooms as indicated on the drawings shall be equipped with a volume control. Each volume control shall be mounted in a single gang box at location and height above the floor as shown and in accordance with Section 16402, "Interior Distribution System". The volume control shall be of the auto transformer type with detented 3 db steps and an OFF position. Each control shall be set so that the maximum volume is sufficient for the areas while not disturbing adjacent areas. Paging signals to the same speaker or group of speakers shall shunt the background music signal by means of a priority relay. Insertion loss of the control shall not exceed 0.6 db. Device plates shall be corrosion-resisting steel with engraved markings to

indicate the volume level selected.

2.10 EQUIPMENT RACKS

Equipment shall be mounted on racks and located as shown on drawings. Ventilated rear panels, solid side panels, and solid top panels shall be provided. Perforations or louvers may be provided in front panels to ensure adequate ventilation of equipment. The racks and panels shall be factory finished with a uniform baked enamel over rust inhibiting primer.

PART 3 EXECUTION

3.1 INSTALLATION

3.1.1 General

Install all system components and appurtenances in accordance with the manufacturer's instructions and as specified herein.

3.1.2 Wiring

Wiring shall be installed in rigid metal conduit, intermediate metal conduit, cable tray, or electric metallic tubing as specified in Section 16402, "Interior Distribution System." Wiring for signal circuits shall terminate on identified terminal blocks in cabinets and master station enclosures. Terminate audio circuits on identified terminal blocks in cabinets and master stations. Cable shield shall be grounded at all points of termination. [Wiring for telephone connection, grounding, line level, speaker and power cables shall be isolated from each other by physical isolation and metallic shielding. Shielding shall be terminated at only one end.]

3.1.2.1 Signal Wiring and Control Wiring

Signal and control circuits shall be installed in accordance with CEI 64-8. Type of signal and control wires and number of conductors shall be provided as recommended by the intercommunication system manufacturer, and as necessary to provide a complete and operable system.

3.1.3 Grounding

CEI 64-8. Ground and distribution ground buses shall be solid copper wire with insulating covering.

[3.1.4 Equipment Racks

Racks shall be mounted side-by-side and bolted together. Items of the same function shall be grouped together, either vertically or side-by-side. Controls shall be symmetrically arranged at a height as shown. Tape equipment shall be at a height above the floor as shown. Audio input and interconnections shall be made with approved shielded cable and plug connectors; output connections may be screw terminal type. All connections to power supplies shall utilize standard male plug and female receptacle connectors with the female receptacle being the source side of the

connection. Inputs, outputs, interconnections, test points, and relays shall be accessible at the rear of the equipment rack for maintenance and testing. Each item shall be removable from the rack without disturbing other items or connections. Empty space in equipment racks shall be covered by blank panels so that the entire front of the rack is occupied by panels.

13.2 FIELD QUALITY CONTROL

3.2.1 Acceptance Tests

After installation has been completed, Contractor shall conduct an acceptance test in the presence of the Contracting Officer or its representative, to demonstrate that the equipment operates in accordance with specification requirements. Contractor shall notify the Contracting Officer [2 weeks] [_____] prior to performance of tests. The acceptance tests shall include originating and accepting messages at specified stations, at proper volume levels, without cross-talk or noise from other links or non-designated units. Test shall utilize the phonetically balanced monosyllabic word intelligibility test in accordance with ANSI S3.2 (ASA 85). In order to be acceptable a score of at least 75 percent must be obtained for each system test.

3.2.2 Retesting

Rectify deficiencies indicated by tests and completely retest work affected by such deficiencies at Contractor's expense.

3.3 INSPECTION

Make observations to verify that units and controls are properly labeled, and interconnecting wires and terminals identified.

3.4 TRAINING

The Contractor shall conduct a training course for 2 members of the operating and maintenance staff as designated by the Contracting Officer. The training course will be given at the installation during normal working hours for a total of 4 hours and shall start after the system is functionally complete but prior to final acceptance tests. The field instructions shall cover all of the items contained in the approved operation and maintenance manuals, as well as demonstrations of routine maintenance operations. The Contracting Officer shall be notified at least 14 days prior to the start of the training course.

3.4.1 Instructor's Qualification Resume

Instructors shall be regular employees of the intercom and paging system manufacturer. The instruction personnel provided to satisfy the requirements above shall be factory certified by the related equipment manufacturer to provide instruction services. Submit the name and qualification resume of the instructor to the Contracting Officer for approval.

3.4.2 Training Plan

Submit training plan 30 calendar days prior to training sessions. Training plan shall include scheduling, content, outline, and training material (handouts).

-- End of Section --