MASTERFORMAT™ 2004 EDITION SECTIONS
27 51 19 – SOUND MASKING SYSTEMS
27 51 13 – PAGING SYSTEMS

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1. PART ONE – GENERAL

1.1. RELATED DOCUMENTS

A.   The General Conditions and Requirements, Special Provisions, of any larger body of specifications, of which this specification may be a part, are hereby made a part of this specification.

1.2. SUMMARY

A.   **This specification includes speakers, network audio components and cabling requirements for an IP based networked sound masking, paging and music system.**

1.3. REFERENCES

A.   UL6500 - Standard for Audio/Video and Musical Instrument Apparatus for Household, Commercial and Similar General Use

B.   UL 2043 - Standard for Fire Test for Heat and Visible Smoke Release for Discrete Products and Their Accessories Installed in Air-Handling Spaces; 1996

C.   UL1480 - Standard for Safety Speakers for Fire Alarm, Emergency, and Commercial and Professional Use

D.   ASTM E 1374-02 - Standard Guide for Open Office Acoustics and Applicable ASTM Standards

E.   ASTM E 1573-02 - Standard Test Method for Evaluating Masking Sound in Open Office Using A-Weighted and One-Third Octave Band Sound Pressure Levels

F.   ASTM E 1130-02e1 - Standard Test Method for Objective Measurement of Speech Privacy in Open Offices Using Articulation Index

1.4. PERFORMANCE REQUIREMENTS

A.   General Performance

1.   The intent of this specification is to provide an I.P. network based sound masking and paging system having the ability to control each and every speaker individually. Systems having two or more speakers on an individual speaker channel, or network address, are not acceptable.

2.   The entire sound masking and paging system shall be controllable from an attached computer. Windows based software shall be provided.

3.   Network speaker controllers shall be PoE having networked audio and electrical power distributed in a single CAT-5 cable. Controllers shall be PoE IEEE 802.3af-2003 compliant.

4.   The basic system configuration shall provide eight (8) networked digital audio streams which can be delivered, in any combination, to any individual speaker or selected groups of speakers. Optionally the system shall be capable of expansion of up to 32 networked audio channels.

5.   The basic system configuration shall provide dual channel, non-coherent soundmasking for alternating networked speakers.

6.   The system shall provide accommodation for the integration of existing, or future, 70.7 volt amplifiers and speaker arrays for use in the creation of hybrid systems having traditional 70.7 volt zones as well as IP addressable speaker zones under the same software control.

B.   Sound Masking Performance

1.   The system shall use DSP technology for sound masking generation and equalization of the sound masking signals.
2.   All sound masking generators shall incorporate 1/3 octave band equalization from 125 Hz. to 10000 Hz. Each generator shall also incorporate a dedicated high pass and low pass filter with configurable slope.
3.   Each rack mounted, centrally located soundmasking generator shall incorporate four non-coherent sound masking generators for network broadcast.
4.   Each speaker controller shall incorporate four internal non-coherent soundmasking generators as well as the ability to receive networked sound masking broadcasts.
5.   The masking volume shall be digitally adjustable in 0.5 dBA increments over a range of 35 dBA to 85 dBA @ 1m.
6.   The sound masking processor shall be a Dynasound DS3008 sound masking and paging processor.

C.   Paging Performance

1.   The system shall use DSP technology for equalization of the paging signals.
2.   The analog page interface shall accept eight (8) balanced line-level audio inputs and provide octave band equalization and compression for each input.
3.   The paging volume shall be digitally adjustable in 0.5 dBA increments over a range of 35 dBA to 85 dBA @ 1m.
4.   The paging processor shall be a Dynasound DS3008 sound masking and paging processor

D.   Automatic Level Control

1.   The system shall provide a timer function allowing network audio levels to be automatically controlled according to a calendar-based user defined schedule.
2.   The system shall provide automatic daylight saving time adjustments.
3.   The system shall provide a transition process that automatically increases the masking volume over a period of time according to a programmed schedule.
4.   The system shall allow for up to four independent timer zones per programmable timer.
5.   The system shall allow independent timer schedules for each day of the week.
6.   The system shall allow user defined rates of volume adjustment and attenuation levels.
7.   The programmable level controller shall be a Dynasound DS1404.

E.   Network Performance

1.   All network switches shall be industry standard PoE IEEE 802.3af-2003 compliant switches such as those manufactured by Netgear, Cisco, LynkSys or other manufacturers of standard network equipment. Proprietary network topology is not acceptable.
2.   The system shall be capable of ensuring that the expected network devices are present and communicating properly and identification of network devices that are not communicating properly.
3.   The network control software shall be capable of monitoring and displaying the current settings for all network devices and speakers.
4.   The system shall be capable of generating detailed reports of all system settings down to the level of individual network devices and speakers.
5.   Each network speaker controller shall have eight (8) speaker outputs.
6.   Speaker controllers shall be capable of equalization, level adjustment and network audio channel selection for every individual speaker.

1.5. SUBMITTALS

A.   Product Data: Manufacturer's specifications and installation instructions
B.   Network Design: Schematics of the network showing quantity and location of network components and related cabling
C.   Warranty Documents: Warranty documents covering the system components.

1.6. QUALITY ASSURANCE

    A.   Manufacturer Qualifications: Minimum of 10 years manufacturing sound masking systems.

    B.   Installer Qualifications: Approved by manufacturer representative and are trained with the specified products or have demonstrated experience with the installation of similar products.

    C.   Uses industry standard network switches and cabling and methodology.

1.7. DELIVERY, STORAGE AND HANDLING

    A.   Protect from moisture during shipping, storage and handling.

    B.   Deliver in manufacturer's original unopened and undamaged packages with manufacturer's labels legible and intact.

    C.   Inspect manufacturer's packages upon receipt.

    D.   Handle packages carefully.

1.8. WARRANTY AND MAINTENANCE

    A.   Provide a written warranty that products installed shall be free from defects in parts or assembly for a 5-year period from date of installation.

2. PART TWO – PRODUCTS

2.1. MANUFACTURERS

    A.   Acceptable Manufacturer: Dynasound, Inc, 6439 Atlantic Blvd. Norcross, GA. 30071.
Toll Free: 800.989.6275.   Tel: 770.242.8176   Fax: 770.242.8858   Web: www.soundmasking.com

    B.   Substitutions: Networked sound masking systems meeting the addressability criteria may be substituted. Systems utilizing primary and secondary network devices where the secondary device is not individually controllable are not acceptable. Systems having more than one speaker connected to a speaker channel are not acceptable.

2.2. SYSTEM COMPONENTS

General System Overview: The sound masking and paging system shall be a PoE networked system with eight digital network audio channels. The system shall be comprised of:

a) rack mounted sound masking/paging/music processors (DS3008)
b) overhead or plenum mounted network speaker controllers (DS8000)
c) rack mounted programmable level controller (DS1404)
d) loudspeaker assemblies (DS1356)
e) PoE network switches
f) cable assemblies

    A.   Each rack mounted DS3008 sound masking / paging / music DSP shall provide:

        1.   Four (4) ea. DSP sound masking generators
        2.   Four (4) ea. DSP 1/3 octave band equalizers for sound masking
        3.   Four (4) ea. DSP configurable low pass and high pass filters
        4.   Eight (8) ea. balanced line level inputs via rear mounted pluggable connectors
        5.   Eight (8) ea. DSP one octave band input equalizers
        6.   Eight (8) ea. DSP input compressors
        7.   Eight (8) ea. balanced line level outputs via rear mounted pluggable connectors
        8.   Eight (8) ea. network digital audio output channels
        9.   Eight (8) ea. balanced analog output channels (for connection to 70.7 volt systems)
        10.   Twelve input by eight output (12x8) DSP matrix mixer
        11.   Dimensions: Width 19.0 inches   Height   1.75 inches; 1 RU
        12.   Network communication components
        13.   Device shall be ETL listed to conform to UL60065

B. Each DS8000 speaker controller shall provide:

1. Four (4) ea. DSP sound masking generators
2. Four (4) ea. DSP 1/3 octave band equalizers for sound masking
3. Four (4) ea. DSP configurable low pass and high pass filters for sound masking
4. Eight (8) ea. digital network audio inputs
5. Eight (8) ea. DSP one octave band equalizers
6. Eight (8) ea. speaker output channels
7. A twelve input by eight output (12x8) DSP matrix mixer
8. PoE network communication components
9. Dimensions: height: 1.5", width 5", length 8"
10. Device shall be ETL listed to conform to UL60065, UL2043

C. Each DS1356 speaker assembly shall provide:

1. A connection to the speaker controller with strain relief
2. An acoustically damped enclosure
3. Eye-bolt for single point suspension and upward facing speaker orientation
4. Overall dimensions: Diameter 8.5" (21.6 cm), Height 4.8" (12.4 cm)
5. Speaker diameter: 6.0 inches
6. Speaker sensitivity: 90 dBA@1Watt, 1 meter pink noise
7. Speaker power rating: 10 watts RMS
8. Speaker frequency response: 100-10,000 Hz
9. Magnet size: 20 oz.
10. Speaker impedance: 8 ohms
11. Device shall be ETL listed to conform to UL1480, UL2043, CSA C22.2 60065

D. Cable assemblies:

1. Provide power, audio and control signals over standard plenum rated CAT-5 with RJ-45 connectors.
2. Provide speaker connections to speaker controllers with two conductors, 18 A.W.G. copper stranded, plenum rated wire.

E. PoE network switches shall be:

1. Professional or commercial quality PoE IEEE 802.3af-2003 compliant network switches as required. CAT-5 with RJ-45 connectors. Typical switch: Netgear FS728TP 24 port PoE

2.3. SOFTWARE CONTROL

A. The Windows® PC based software shall provide:

1. The ability to adjust any individual speaker without affecting adjacent speakers
2. The ability to define and adjust groups of speakers
3. Sound masking volume and equalization
4. Paging volume and equalization
5. The ability to route any mix of eight network audio channels to any individual speaker
6. The ability to create and adjust zones for paging and music
7. Reporting of all system settings
8. Backup and restore functions for all system settings
9. Network diagnostics

B. In addition to the provided software, all system functions shall be controllable via SNMP (simple network management protocol) to facilitate integration into other building control systems or end user systems.

3. **PART THREE - EXECUTION**

   3.1. **NETWORK DESIGN**

      A.   Design network according to manufacturer's specifications.

   3.2. **SITE CONDITIONS**

      A.   Verify facility conditions are suitable for the system installation.
      B.   Verify the facility is constructed according to plans including wall locations, ceiling types, plenum barriers and plenum heights.
      C.   Ensure sufficient space and power for centrally located components is available as per plan and manufacturer's specifications.

   3.3. **PERMITS**

      A.   Obtain necessary permits for installation work.

   3.4. **INSTALLATION**

      A.   Follow all applicable codes for the area.
      B.   Follow the system design for location of speaker controllers, speakers and wiring.
      C.   Record any necessary changes to the system design on the plan

   3.5. **FIELD QUALITY CONTROL**

      A.   Ensure that distance between the top of the loudspeaker and the deck meets manufacturer's minimum specifications
      B.   Ensure that loudspeakers are not obstructed
      C.   Ensure cables are properly supported and securely terminated

   3.6. **NETWORK CONFIGURATION AND ADJUSTMENT**

      A.   Follow manufacturer's recommendations for system settings as found in the Dynasound Privacy Manager User Manual.

   3.7. **TESTING AND REPORTING**
      A.   Test covered areas for desired spectrum and spatial uniformity
      B.   Verify that all system audio functions and timers are correctly configured per plan

   3.8. **AS-BUILTS AND DOCUMENTATION**

      A.   Provide detailed drawings showing all speaker controllers and speaker Identifications
      B.   Provide a printed report detailing system settings
      C.   Provide all instruction and installation documents.
      D.   Provide all close-out and warranty information