UNIFIED FACILITIES GUIDE SPECIFICATIONS

References are in agreement with UMRL dated January 2021
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USACE / NAVFAC / AFCEC / NASA	**UFGS-13 21 48 (April 2006)**

Preparing Activity: NAVFAC	**Replacing without change UFGS-13034 (August 2004)**

UNIFIED FACILITIES GUIDE SPECIFICATIONS

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SECTION 13 21 48

PREFABRICATED AUDIOMETRIC ROOMS
04/06

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NOTE: This guide specification covers the requirements for prefabricated audiometric rooms.

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).

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NOTE: The following information shall be shown on the project drawings:

1. Location of equipment

a. Location of the space to be used for testing;

b. The size of the space: length X width X height;

c. A plan view of the space to determine the location of the window and the door swing;

d. Electric outlets;

e. The power supply access.

f. The number of chamber positions.

2. Site selection ambient noise measurement:

a. The ambient noise levels in the selected site shall be measured prior to the installing of audiometric test chamber. The octave-band levels shall not exceed the values given in the following table:

Octave-band Center Frequency-Hz	125	250	500	1000	2000	4000	8000
Exterior (outside room) ambient noise level in db	65	61	61	80	90	95	95

****

PART 1 GENERAL

1.1 REFERENCES

****

NOTE: This paragraph is used to list the publications cited in the text of the guide specification. The publications are referred to in the text by basic designation only and listed in this paragraph by organization, designation, date, and title.

Use the Reference Wizard's Check Reference feature when you add a Reference Identifier (RID) outside of the Section's Reference Article to automatically place the reference in the Reference Article. Also use the Reference Wizard's Check Reference feature to update the issue dates.

References not used in the text will automatically be deleted from this section of the project specification when you choose to reconcile references in the publish print process.

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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.

ACOUSTICAL SOCIETY OF AMERICA (ASA)

ASA S3.1 (1999; R 2018) American National Standard Maximum Permissible Ambient Noise Levels for Audiometric Test Rooms (ASA 99)

ASTM INTERNATIONAL (ASTM)

ASTM C423 (2009a) Sound Absorption and Sound Absorption Coefficients by the Reverberation Room Method

ASTM D2859 (2016) Standard Test Method for Ignition Characteristics of Finished Textile Floor Covering Materials

ASTM E84 (2020) Standard Test Method for Surface Burning Characteristics of Building Materials

ASTM E596 (1996; R 2016) Standard Test Method for Laboratory Measurement of Noise Reduction of Sound-Isolating Enclosures

ASTM E648 (2019a) Standard Test Method for Critical Radiant Flux of Floor-Covering Systems Using a Radiant Heat Energy Source

NATIONAL ASSOCIATION OF ARCHITECTURAL METAL MANUFACTURERS (NAAMM)

NAAMM AMP 500 (2006) Metal Finishes Manual

U.S. DEPARTMENT OF DEFENSE (DOD)

MIL-STD-1691 (1994; Rev F) Construction and Material Schedule for Military Medical and Dental Facilities

UNDERWRITERS LABORATORIES (UL)

UL 6 (2007; Reprint Sep 2019) UL Standard for Safety Electrical Rigid Metal Conduit-Steel

1.2 RELATED REQUIREMENTS

Conform to Section 11 70 00 GENERAL REQUIREMENTS FOR MEDICAL AND DENTAL EQUIPMENT. Provide the final utility connections and utility service to the equipment in accordance with Section 23 03 00.00 20 BASIC MECHANICAL MATERIALS AND METHODS; and Section 26 20 00 INTERIOR DISTRIBUTION SYSTEM.

1.3 PERFORMANCE REQUIREMENTS

1.3.1 Noise Dampening Performance

a. Noise reduction: The noise reduction from the outside to the inside of a properly installed audiometric test chamber, as tested in accordance with ASTM E596 and performed in a recognized, independent and approved laboratory, shall be not less than the values in the following table:

Octave-band Center Frequency-Hz	125	250	500	1000	2000	4000	8000
Noise reduction in dB	24	30	40	50	55	55	55

b. Sound absorption: The sound absorption of the composite metal and sound-absorbing panel assembly, as tested in accordance with ASTM C423 and performed in a recognized independent and approved laboratory, shall not be less than the values in the following table:

Octave-band Center Frequency-Hz	125	250	500	1000	2000	4000	8000	NRC
Sound Absorption Coefficients	.41	1.1	1.1	1.02	.93	.89	--	.95

c. Interior noise level: The interior ambient noise level measured inside of a properly installed audiometric test chamber, as tested in accordance with ASA S3.1 and performed in a recognized independent and approved laboratory, shall be not greater than the values in the following table (ventilation fan on):

Octave-band Center Frequency-Hz	500	1000	2000	4000	8000
Maximum permissible interior noise in dB	21.5	29.5	34.5	39.0	41.0

1.4 SUBMITTALS

****

NOTE: Review Submittal Description (SD) definitions in Section 01 33 00 SUBMITTAL PROCEDURES and edit the following list, and corresponding submittal items in the text, to reflect only the submittals required for the project. The Guide Specification technical editors have classified 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 Army projects, fill in the empty brackets following the "G" classification, with a code of up to three characters 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" classification indicates submittals required as proof of compliance for sustainability Guiding Principles Validation or Third Party Certification and as described in Section 01 33 00 SUBMITTAL PROCEDURES.

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

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Government approval is required for submittals with a "G" or "S"

classification. Submittals not having a "G" or "S" classification are [for Contractor Quality Control approval.][for information only. When used, a code following the "G" classification identifies the office that will review the submittal for the Government.] Submit the following in accordance with Section 01 33 00 SUBMITTAL PROCEDURES:

Conform to submittal requirements of Section 11 70 00 GENERAL REQUIREMENTS FOR MEDICAL AND DENTAL EQUIPMENT.

SD-02 Shop Drawings

[M-0250, audiometric testing room]

[M-0300, audiometric examination booth]

SD-03 Product Data

M-0250, audiometric testing room

M-0300, audiometric examination booth

SD-04 Samples

****
NOTE: All available item specifications applicable to this section have been furnished in joint schedule number (JSN) alpha-numerical order. The JSN is referenced from MIL-STD-1691.
****

****
NOTE: Delete any items not used, and add additional items as required.
****

[M-0250, audiometric testing room; G[, [_____]]]

[M-0300, audiometric examination booth; G[, [_____]]]

SD-06 Test Reports

Noise reduction test

Sound absorption test

Interior noise level test

Submit test reports indicating compliance with the performances listed in paragraph entitled "Performance Requirements."

SD-07 Certificates

****
NOTE: All item specifications applicable to this section have been furnished in joint schedule number (JSN) alpha-numerical order. The JSN is referenced from MIL-STD-1691.
****

****
NOTE: Delete any items not used, and add additional items as required.
****

[M-0250, audiometric testing room]

[M-0300, audiometric examination booth]

Include written certification that the test data were taken on sample components identical to the material supplied under this specification.

SD-10 Operation and Maintenance Data

M-0250, audiometric testing room, Data Package 3; G[, [_____]]

M-0300, audiometric examination booth, Data Package 3; G[, [_____]]

Submit in accordance with Section 01 78 23 OPERATION AND MAINTENANCE DATA.

PART 2 PRODUCTS

2.1 GENERAL CHARACTERISTICS

a. The manufacturer shall certify the audiometric testing [room] [booth] as a quiet environment for the testing of hearing.

b. Construct the audiometric testing [room] [booth] of modular panels to allow expeditious installation and relocation of the booths.

c. Equip the audiometric testing [room] [booth] with a window, an audiometric jack panel underneath the window, an inside light, and a ventilation system.

d. Design the [room] [booth] to allow for installation within 4 inches of walls.

2.2 MATERIALS AND CONSTRUCTION

[Single wall] [Double wall].

2.2.1 Walls and Roof Panels

Construct the walls and roof panels as a multilayered sandwich of acoustical materials. The overall thickness of the panels shall be 100 mm 4 inches. The outer panels shall be 16 gage, cold-rolled steel. The inner surface shall be 22 gage, cold-rolled steel with 2 mm 3/32 inch perforations at 5 mm 3/16 inch staggered-on-centers. Frame the panels using 16 gage channels with continuous arch-welded joints. The average weight of the panels shall be a minimum of 50 kg per square meter 10 pounds per square foot. The total weight of the panel shall be a maximum of 182 kg 400 pounds.

2.2.2 Floor Panel

Construct the floor panel as a multilayered sandwich of materials to allow for the support of a load of 240 kg per sq m 50 pounds per square foot.

The overall thickness of the floor shall be 100 mm 4 inches. The walking surface shall consist of a minimum of 11 gage, corrosion-resistant steel; the bottom surface shall consist of a minimum of 16-gage steel, structurally reinforced. The average weight of the floor panel shall be a minimum of 50 kg per sq m 10 pounds per square foot. The total weight of the panel shall be a maximum of 182 kg 400 pounds.

2.2.3 Vibration Isolation

Provide vibration isolation by mounting the audiometric test chamber mounted on vibration isolation rails, consisting of rubber-in-shear isolators mounted to 75 mm 3 inch structural channels for weight distribution. The vibration isolators shall have a natural resonant frequency of 6 1/4 Hz for maximum elimination of structure-borne vibration.

2.2.4 Door

The door shall be acoustically sealed and provide a minimum clear opening of 810 mm 32 inches. Unless otherwise indicated, the door shall be hinged on the right (facing outward) and shall swing out of the chamber. The door shall be constructed using materials similar to those used for the wall panels. Equip the door with two magnetic compression seals spaced to provide dead airspace. Equip the bottom of the door with either a gravity-activated seal or a compression seal activated by a cam seating of the door within the frame. Provide either surface mounted or butt-type hinges. If butt-type hinges are used, the magnetic seals shall not be broken by the hinges. The hinges shall contain a cam-lift mechanism to ensure proper seating of the door.

2.2.5 Wall and Corner Joiners

All wall and roof panels shall be acoustically and structurally joined together using a member shaped according to the corner or joint configuration. The member shall be made of 16-gage steel and shall be made to allow for the use of pop rivets or sheet metal screws to fasten it in place. The dead airspace between the panels and the member shall be filled with acoustical material and shall be caulked for air-tight integrity.

2.2.6 Acoustical Fill

Fill all panels, walls, and doors with inert mildew- and vermin-resistant acoustical attenuating and absorbing material. When tested in accordance with ASTM E84, the material shall have maximum fire hazard ratings of 25 for flame spread, zero for fuel contribution, and 50 for smoke density.

2.2.7 Windows

600 mm wide by 760 mm 24 inches wide by 30 inches high, double-glazed, using 6 mm 1/4 inch safety glass. Mount glass with acoustically tight rubber gaskets.

2.3 UTILITY FEATURES

2.3.1 Jack Panel

The jack panel shall be insulated and shall contain six 3 wire, phone-type jacks with covers with one three-pin and one four-pin connector per panel, in accordance with the manufacturers standard. Each phone jack shall be insulated from the booth and from the other jacks. The jack panels shall

be designed to preserve the acoustical integrity of the room.

2.3.2 Ventilation System

The ventilation system shall be incorporated into the roof panel, except where a multiposition chamber is specified the vent system shall be incorporated into the wall. The silencer for the ventilation system shall not intrude into the room. The noise from the ventilation system shall be below the threshold of hearing when measured 900 mm 3 feet from the opening. The airflow shall be a minimum of 50 L/s 100 cubic feet per minute, except where a multiposition chamber is specified.

2.3.3 Electrical System

Equip the chamber with a recessed 110 volt light fixture with a 40 watt incandescent lamp, except in multiposition test chambers, where indicated. The chamber shall be prewired and shall include switches mounted 1400 mm 4 feet 8 inches above the floor, opposite the side of the door hinges for the light fixture and the ventilation fan. Electrical components shall be UL approved. Factory installed internal wiring shall be in rigid conduits conforming to UL 6, concealed in the chamber. Wiring shall extend to the outside of the enclosure connecting to a prewired electrical harness terminating in a 4 meter 12 footpowercord with a hospital grade plug. Provide convenience outlets as indicated.

2.3.4 Floor Covering

Cover the floor with a 100-percent, continuous-filament nylon carpet on a pad. The carpet and pad system shall comply with ASTM D2859 and shall have a minimum average critical radiant flux of 0.25 watt per square centimeter when measured in accordance with ASTM E648.

2.3.5 Finish

Exposed sheet metal surfaces shall be cleaned and degreased. Fill and grind welds smooth. Prime metal with a rust-inhibiting chromate modified alkyd primer. The finish coat shall be an acrylic enamel-type paint. The quality standards of the NAAMM AMP 500 National Association of Architectural Metal Manufacturers shall apply. Color shall be selected from the manufacturers color standards.

2.4 MULTIPOSITION TEST CHAMBERS

The following additional requirements shall be provided:

a. The jack panels shall provide two 3-wire phone jacks per position. The wiring for the group system jacks shall be Contractor-furnished but Government-installed.

b. Each position within the test chamber shall be divided by a heavy canvas divider.

c. Provide metal stools with upholstered tops.

d. Vibration isolator rails shall extend the full length of the long dimension of the test chamber.

e. Ventilation systems shall be installed on the exterior walls. The airflow shall be a minimum of 140 L/s 300 cubic feet per minute for 4

position rooms, 210 L/s 450 cubic feet per minute for 6 position rooms, and 240 L/s 500 cubic feet per minute for 10 position rooms.

f. The window shall be mounted in the door.

2.5 ITEMS

Items are listed by joint schedule number (JSN) referenced from MIL-STD-1691.

****
NOTE:

1. All available item specifications applicable to this section have been furnished in joint schedule number (JSN) alpha-numerical order. The JSN is referenced from MIL-STD-1691.

2. Delete any items not used, and add additional items as required.
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NOTE: The first paragraph following is a sample guide to be used in generating an item specification. The item number should correspond with the JSN used on the schedule. If no JSN is available, have the item number correspond with the appropriate identification code used on the contract documents.
****

2.5.1 Item [_____], [_____]:

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NOTE: In paragraph entitled "Item [_____], [_____]" insert the item identification number and the item name in the first blank space, respectively. Insert a description of the item in the second blank space to determine the type of product required. Avoid repetition of detailed information which is to appear in the salient features listed thereafter. In paragraphs entitled "Item M-0250, Audiometric Testing Room" and "Item M-0300, Audiometric Examination Booth" use the second bracketed option for double wall construction.
****

The unit shall be [[_____].]

2.5.1.1 Include the following:

[a. [_____].]

[b. [_____].]

[c. [_____].]

2.5.2 Item M-0250, Audiometric Testing Room

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NOTE: In paragraph entitled "Item [_____], [_____]" insert the item identification number and the item name in the first blank space, respectively. Insert a description of the item in the second blank space to determine the type of product required. Avoid repetition of detailed information which is to appear in the salient features listed thereafter. In paragraphs entitled "Item M-0250, Audiometric Testing Room" and "Item M-0300, Audiometric Examination Booth" use the second bracketed option for double wall construction.

****

The audiometric testing room shall be prefabricated; approximately [1980 mm high by 2100 mm wide by 2235 mm deep inside, 2235 mm high by 2340 mm wide by 2440 mm deep outside,] [1980 mm high by 2100 mm wide by 2235 mm deep inside, 2235 mm high by 2740 mm wide by 2840 mm deep outside,] [78 inches high by 84 inches wide by 88 inches deep inside, 88 inches high by 92 inches wide by 96 inches deep outside,] [78 inches high by 84 inches wide by 88 inches deep inside, 96 inches high by 108 inches wide by 112 inches deep outside,] and shall have a continuous ventilating system and a shelf mounted on the outer wall beneath the observation window.

2.5.3 Item M-0300, Audiometric Examination Booth

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NOTE: In paragraph entitled "Item [_____], [_____]" insert the item identification number and the item name in the first blank space, respectively. Insert a description of the item in the second blank space to determine the type of product required. Avoid repetition of detailed information which is to appear in the salient features listed thereafter. In paragraphs entitled "Item M-0250, Audiometric Testing Room" and "Item M-0300, Audiometric Examination Booth" use the second bracketed option for double wall construction.

****

The audiometric examination booth shall be prefabricated; approximately [1980 mm high by 1000 mm wide by 900 mm deep inside, 2235 mm high by 1200 mm wide by 1120 mm deep outside,] [1980 mm high by 1000 mm wide by 900 mm deep inside, 2440 mm high by 1625 mm wide by 1500 mm deep outside,] [78 inches high by 40 inches wide by 36 inches deep inside, 88 inches high by 48 inches wide by 44 inches deep outside,] [78 inches high by 40 inches wide by 36 inches deep inside, 96 inches high by 64 inches wide by 60 inches deep outside,] and shall have a continuous ventilation system and a shelf mounted on the outside wall beneath the observation window.

PART 3 EXECUTION

3.1 INSTALLATION

****

NOTE: Provide a ramp of sufficient size to facilitate the use of wheeled equipment.

****

Install the items at the locations indicated. Conform to the installation requirements of Section 11 70 00 GENERAL REQUIREMENTS FOR MEDICAL AND DENTAL EQUIPMENT.

3.1.1 [Audiometric Testing Rooms] [and] [Examination Booths]

Assemble the [audiometric testing rooms] [and] [examination booths] on the site using prefabricated panels, doors, windows, ventilation silencers, and assembly hardware, meeting all the requirements specified in this section.

3.2 FIELD QUALITY CONTROL

3.2.1 Inspection

Examine each item for visual defects, and correct all defects to conform to the specifications.

-- End of Section --