

(September 2021)

PERFORMANCE CRITERIA
FOR

SECTION 27 41 16

INTEGRATED AUDIO-VIDEO SYSTEMS AND EQUIPMENT

09/21

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GENERAL

This Performance Criteria (PC) specifies the installation and quality of integrated audio-video systems and equipment.

Note: A typical Audiovisual System consists of a network of audio inputs, video inputs, selectable controls, and displays that are linked together to form an audiovisual system within an auditorium, lecture hall, gymnasium, or conference room. Real property, including raceway, cable tray, junction boxes, etc. are not included in this criteria. For video teleconferencing systems, refer to criteria section 27 41 43 – Audio-Video Conferencing.

1.1 REFERENCES

1.1.1 Unified Facilities Criteria (UFC)

Contractor must comply with the following:

- A. UFC 1-200-01 General Building Requirements
- B. UFC 3-501-01 Electrical Engineering
- C. UFC 3-580-01 Telecom Building Cabling Systems Planning and Design
- D. UFC 4-010-06 Cybersecurity
- E. UFC 4-510-01 Military Medical Facilities

1.1.2 Military Standard

- A. MIL-STD 1691 Construction and Material Schedule for Medical, Dental, Veterinary and Medical Research Laboratories

1.1.3 National Fire Protection Association (NFPA)

- A. NFPA 99 Healthcare Facilities Code
- B. NFPA 101 Life Safety Code

1.1.4 Military Health System Standards

- A. Defense Health Agency Standards
 - 1. Building Control Systems Categorization Memorandum
 - 2. Cyber Security Controls for Physically Isolated Systems
 - 3. Cyber Security Controls for Medical Community of Interest (MEDCOI)
- B. Department of Defense Standards
 - 1. Department of Defense Instruction (DoDI) Number 8500.01

2. Department of Defense Instruction (DoDI) Number 8510.01
3. Department of Defense Instruction (DoDI) Number 8530.01

1.1.5 Federal Communications Commission (FCC)

- A. FCC Approved RF Communicating Device

1.1.6 Other Standards

- A. Reserved for future

2.1 DESCRIPTION & MATERIALS

All requirements within the MIL-STD-1691 JSN descriptions must be met, as well as the performance guidelines listed in the following descriptions.

2.1.1 General

- A. System and materials used must be UL listed and labeled; must be suitable for the environment in which they are installed.
- B. Audiovisual system must be non-proprietary.
- C. [Audiovisual system must provide continuous operation with minimum [30] [___] minutes of battery backup and battery condition indication.]
- D. Provide surge protection for audiovisual system components.
- E. Provide A/V system equipment which provides complete coverage throughout desired space.
- F. System must interface with Fire Alarm and Mass Notification System to mute during a fire alarm or notification.
- G. Where Bluetooth functions are specified, the Bluetooth functionality must be disabled. The Bluetooth functionality must be able to be turned on after installation and review with the Information Assurance Representative.
- H. Provide cabling and other balance of system components in accordance with the manufacturer's recommendations and UFGS 27 10 00 – Building Telecommunications Cabling System.
- I. System must not have an anticipated end of system support in the next [18] [___] months. Systems being phased out are not acceptable.
- J. [System must interface with Public Address system.]
- K. [System must interface with VoIP phone system.]
- L. [System must interface with Network Music system.]
- M. [System must interface with Interactive TV System.]
- N. [System must interface with Lighting Control System.]
- O. [System must interface with VTC Equipment System.]
- P. All products that have interoperability capable hardware (i.e. internal storage, data transmission via wireless, ethernet, of USB to PC or server connectivity) must meet DoDI and/or Cybersecurity requirements.

2.1.2 Auditorium Audiovisual (AV)

- A. System integrates with Sound Reinforcement System and must utilize digital technology for always reproduced high-quality sound with less than 1 percent total distortion at loudspeakers during equipment operation including standby mode with inputs off; output free of non-uniform coverage of amplified sound.
- B. Provide speakers at all displays, with minimum regenerated sound delay of [1 second] [___].
- C. System must have sound feedback monitoring and stabilization.
- D. System must provide surround sound throughout [95%] [___] of the enclosed space.
- E. Wireless hearing assistance system
 1. System must convert up to [4] [___] analog audio input sources and wirelessly delivers high-quality stereo audio up to [60] [___] users and over a coverage area of [7,000] [___] sq. ft.
 2. Wireless access points must operate on FCC approved frequency ranging from [2.4 GHz to 5 GHz] [___].
 3. System must operate on all frequencies between 20 Hz – 20 kHz with minimum 0.5% distortion.
 4. UL listed external power supply: [120 Vac, 60 Hz, 20A] [___].
 5. Data rate must be minimum [Gigabit Ethernet] [___].
 6. Audio listening devices to include: [Mobile Phone App] [Portable Audio Listening Device] [___].
 7. [Mobile phone app must be non-proprietary operating on Apple and Android platforms.]
 8. [Portable audio listening devices must reproduce high-quality sound wirelessly and transmit sound through ear speaker.]
 9. Equipment must be rack mounted, located per plans.
- F. Video Display System

1. Capable of serving [10] [____] displays from minimum [10] [____] input devices, configured to play common video stream on all displays, separate video streams on all displays, or combination of both.
 2. Video streams must be minimum [4K-High definition] [1080p] [1080i] [720p] [720i] [____].
 3. System must be capable of scaling video input signals of Composite Video (480i or 576i) to [1920 x 1080p] [____], while scaling or reproducing 1080p high definition to 4K-High definition.
 4. Audio to Video delay must not be more than [1 second] [____].
 5. Controllability of video inputs, displays, volume, and channel must be provided at operator console, refer to plans for locations.
 6. Control station must provide on-screen display for presenter/controller viewing.
 7. Provide with DVR and recording capabilities to reproduce presentations [and video streams].
 8. Equipment must be rack mounted, located per plans.
 9. Video displays must be by [fixed] [portable] [TVs, furnished and installed by others] [and] [fixed projectors and screens].
- G.** Provide control station to provide selectable preset settings video, audio, camera, [screen] [,] and lighting settings, with override control of video input switching; audio volume control, switching, and mixing; camera pan, tilt, zoom (PTZ); [motorized screen control] [,] and lighting override control.
- H.** System must be capable of being split into multiple individual systems, or operate as one large system, depending on room configuration and separation.
- I.** Provide documentation for each device which can be stored and accessed.

2.1.3 Large Conference Room Audiovisual (AV)

- A.** Open architecture with minimum [5] [____] displays with minimum [10] [____] input devices, configured to play common video stream on all displays, separate video streams on all displays, or combination of both.
- B.** System must be capable of scaling video input signals of Composite Video (480i or 576i) to [1920 x 1080p] [____], while scaling or reproducing 1080p high definition to 4K-High definition.
- C.** Audio to Video delay must not be more than [1 second] [____].
- D.** Controllability of video inputs, displays, volume, and channel must be provided at operator console, refer to plans for locations.
- E.** System must utilize desk mount bulkhead connectors for input at table, to tie into displays with controllability at operator console.
 1. Bulkhead connections must include: [Component] [VGA + 3.5 mm Audio] [HDMI] [USB] [Ethernet] [____].
 2. Individual desktop inputs must be consolidated to common switch.
- F.** Provide with DVR and recording capabilities to reproduce presentations [and video streams].
- G.** Equipment must be rack mounted, located per plans.
- H.** Video displays must be by [fixed] [portable] [TVs, furnished and installed by others] [and] [fixed projectors and screen].
- I.** System integrates with Sound Reinforcement System and must utilize digital technology for reproduced high-quality sound that is always free of noise and distortion at loudspeakers during equipment operation including standby mode with inputs off, output free of non-uniform coverage of amplified sound.
- J.** Provide speakers at all displays, with minimum regenerated sound delay of [1 second] [____].
- K.** System must have sound feedback monitoring and stabilization.
- L.** System must provide surround sound throughout [95%] [____] of the enclosed space.
- M.** Provide control station to provide override control of video input switching; audio volume control, switching, and mixing; camera pan, tilt, zoom (PTZ); [motorized screen control] [,] and lighting override control.
- N.** System must be capable of being split into multiple individual systems, or operate as one large system, depending on room configuration and separation.
- O.** Provide documentation for each device which can be stored and accessed.

2.1.4 Small Conference Room Audiovisual (AV)

- A.** Open architecture with minimum [2] [____] displays with minimum [5] [____] input devices, configured to play common video stream on all displays, separate video streams on all displays, or combination of both.
- B.** System must be capable of scaling video input signals of Composite Video (480i or 576i) to [1920 x 1080p] [____], while scaling or reproducing 1080p high definition to 4K-High definition.
- C.** Audio to Video delay must not be more than [1 second] [____].
- D.** Controllability of video inputs, displays, volume, and channel must be provided at operator console, refer to plans for locations.
- E.** Provide with DVR and recording capabilities to reproduce presentations [and video streams].
- F.** Equipment must be rack mounted, located per plans.

- G. Video displays must be by [fixed] [portable] [TVs, furnished and installed by others] [and] [fixed projectors and screens].
- H. System integrates with Sound Reinforcement System and must utilize digital technology for reproduced high-quality sound that is always free of noise and distortion at loudspeakers during equipment operation including standby mode with inputs off, output free of non-uniform coverage of amplified sound.
- I. Provide speakers at all displays, with minimum regenerated sound delay of [1 second] [____].
- J. System must have sound feedback monitoring and stabilization.
- K. System must provide surround sound throughout [95%] [____] of the enclosed space.
- L. Provide control station to provide override control of video input switching; audio volume control, switching, and mixing; camera pan, tilt, zoom (PTZ); [motorized screen control] [,] and lighting override control.
- M. System must be capable of being split into multiple individual systems, or operate as one large system, depending on room configuration and separation.
- N. Provide documentation for each device which can be stored and accessed.

2.1.5 Sound Reinforcement System

- A. System must utilize digital technology for reproduced high-quality sound that is free of noise and distortion at all loudspeakers at all times during equipment operation including standby mode with inputs off, output free of non-uniform coverage of amplified sound.
- B. Selectively connect any zone to any available signal channel.
- C. Selectively control sound from microphone outlets and other inputs.
- D. System to provide voice interrupt function for interruption of basic communication with emergency voice or data override, capable of prioritizing critical communications levels.
- E. System to provide intelligent audio for automatic volume adjustments to compensate for background noise.
- F. Bluetooth capability for integration with wireless audio accessories
- G. Connect via IP multiple audio reinforcement systems for complete campus coverage, to operate as one continuous system.

2.1.6 Mixer/Bridge

- A. Open architecture with minimum [4] [____] audio inputs with minimum [4] [____] audio outputs.
- B. High quality microphone preamp with minimum [24] [____] Bit converters for ultra-low noise floor for smooth sound.
- C. RJ45 Ethernet connection for TCP/IP network-based override control and monitoring, with Windows software program for remote control.
- D. Output peak and signal indicator LEDs
- E. UL listed external power supply: [120 Vac, 60 Hz, 20A] [____].
- F. [Console] [Rack] mount.
- G. [Rack mount kit, maximum 1 RU]
- H. Output Power: Plus 20 dB above 1mW at matched power-amplifier load.
- I. Total Harmonic Distortion: Less than 1 percent.
- J. Frequency Response: Within plus or minus 1 dB from 20 Hz to 20,000 Hz.
- K. Minimum Noise Level: Minus 55 dB below rated output.
- L. Maximum Delay: 10mS – 2 Second
- M. Must include the following: [Gain Sharing Auto Mixer] [,] [Matrix Mixer] [,] [Gating Auto Mixer] [,] [L & R Mixer] [,] [LCR Mixer] [,] [RMS Meters] [,] [Ducker].
- N. Provide documentation for each repeater device which can be stored and accessed.

2.1.7 Amplifier

- A. [Console] [Rack] mount internally ventilated and fan cooling unit.
- B. UL listed external power supply: [120 Vac, 60 Hz, 20A] [____].
- C. Output Power: 70-V balanced line. Configured to accommodate the use of Class II cabling without conduit. [80 percent of the sum of wattage setting of connected] for each station and speaker connected in all-call mode of operation, plus an allowance for future stations.
- D. Total Harmonic Distortion: Less than 3 percent at rated power output from 50 to 12,000 Hz.
- E. Minimum Signal-to-Noise Ratio: 60 dB, at rated output.
- F. Frequency Response: Within plus or minus 2 dB from 30 to 50,000 Hz.
- G. Output Regulation: Less than 2 dB from full to no load.
- H. Minimum [2] [____] channels with [Terminal Block] [and] [XLR] connector types.

- I. Input Sensitivity: Matched to preamplifier and to provide full-rated output with sound-pressure level of less than 10 dynes/sq. cm impinging on speaker microphone or handset transmitter.
- J. Stereo, Bridge, or Parallel selectable operating modes
- K. Provide documentation for each repeater device which can be stored and accessed.

2.1.8 Audio Input

- A. [Single gang female audio input device with [cardioid] [omni] polar characteristic.]
- B. [Radio tuner signal input device.]
- C. [Network distributed music system input device.]
- D. Microphone:
 1. Type: Dynamic, with [cardioid] [omni] polar characteristic.
 2. Impedance: 150 ohms.
 3. Frequency Response: Uniform, 50 to 14,000 Hz.
 4. Output Level: Minus 58 dB, minimum.
 5. Finish: Satin Chrome
 6. Cable: [C25J] [Cat 5e or Higher]
 7. Mounting: [Desk Stand with integral-locking, press-to-talk switch] [Universal, wire-less with adapter and cable input required]
- E. Provide documentation for each portable radio device which can be stored and accessed.

2.1.9 Audio Controller

- A. [Double-gang wall plate control with minimum [4] [___] preset selectable audio scenes along with sound attenuator for override control of preset scenes.
 1. Wall controller to be powered via [Power over Ethernet (PoE) network] [external 24V power supply]
 2. Wall control finish to be: [Black] [Stainless Steel] [White] [___].]
- B. [Network control software for control of all speaker zones, input devices, and other audio devices within system.]

2.1.10 Loud Speakers

- A. Cone-Type:
 1. Minimum Axial Sensitivity: 91 dB at one meter, with 1-W input.
 2. Frequency Response: Within plus or minus 3 dB from 50 to 15,000 Hz.
 3. Size: 8 inches with 1-inch voice coil and minimum 5-oz. ceramic magnet.
 4. Minimum Dispersion Angle: 100 degrees.
 5. Rated Output Level: 10 W.
 6. Matching Transformer: Full-power rated with four taps. Maximum insertion loss of 0.5 dB.
 7. Surface-Mounting Units: Ceiling or Wall mounting, as indicated, in steel back boxes, acoustically dampened. Front face of at least 0.0478-inch steel and whole assembly rust proofed, and shop primed for field painting.
 8. Flush-Ceiling-Mounting Units: In steel back boxes, acoustically dampened. Metal ceiling grille with [white] [___] baked enamel.
- B. High Performance Coaxial Type:
 1. Minimum Axial Sensitivity: 99 dB at one meter, with 1-W input.
 2. Frequency Response: Within plus or minus 5 dB from 55 to 15,000 Hz.
 3. Size: Maximum [20" H x 15" W x 15" D] [___] enclosure, 12 inches with 1-inch titanium diaphragm compression driver.
 4. Minimum Dispersion Angle: 90 degree (conical).
 5. Rated Output Level: 250 W.
 6. Matching Transformer: Full-power rated with four taps. Maximum insertion loss of 0.5 dB.
 7. Surface-Mounting Units: Wall or Pendant mounting with integral bracket, as indicated, in [steel] [wood] enclosure with [steel] [___] grille, acoustically dampened. Front face of at least 0.0478-inch steel and whole assembly rust proofed and [shop primed for field painting] [white finish] [black finish].
- C. Provide documentation for each portable radio device which can be stored and accessed.

2.1.11 [Projector

- A. Full HD Color with minimum [Wide UXGA 1920 x 1200] [4k 4096 x 2160] [___] resolution.
- B. Projector brightness must be provided based on throw distance, minimum [2000] [3000] [5000] [___] lumen.
- C. Contrast ratio minimum [6000:1] [1000000:1] [___], with aspect ratio minimum [16:10] [17:9] [___].
- D. Inputs/outputs must include: [Component] [,] [HDMI] [,] [Screen Trigger] [,] [Ethernet/RJ45] [,] [VGA] [,] [and] [RS-232].
- E. [Ceiling] [Wall] mount [front] [rear] projection with zoom and focus lens minimum throw ratio [1.27 – 2.73:1].

- F. Universal power supply, 100V to 240V, 50/60Hz maximum 500W AC.
- G. Lamp life minimum [20,000] [____] hours.
- H. Projector must integrate with Audiovisual System.]

2.1.12 Projector Screen

M0401 – Screen, Projection, 50 x 50

M0405 – Screen, Projection, 84 x 84

M0410 – Screen, Projection, 70 x 70

- A. Ceiling and Wall Surface mount manual screen.
- B. Minimum 1:1 ratio, diagonal size to be minimum 70.7 in.
- C. Front projection high contrast matte white screen.
- D. Maximum 1.1 gain with 180° viewing angle.

2.1.13 Conductors and Cabling

- A. Jacketed, twisted pair and twisted multi-pair, untinned solid copper.
- B. Thermoplastic, not less than 1/32-inch-thick insulation for in conduit.
- C. Microphone cables: neoprene jacketed, not less than 2/64 inch thick, over shield with filled interstices. Shield No. 34 AWG, tinned, soft-copper strands formed into a braid or approved equivalent foil. Shielding coverage on conductors is not less than 60 percent.
- D. Video cables:
 - 1. HDMI – Ultra HD 4K resolution capable, plenum rated neoprene jacket around plastic optical fibers. Thin, flexible cabling capable of 0.2-inch bend radius. Male connectors on both ends, minimum 10Gbps bandwidth, immune to EMI/RFI noise. Plug-and-play capable, EDID, CEC and HDCP compatible.
 - 2. VGA - neoprene jacketed, not less than 2/64 inch thick, over shield with filled interstices. Shield No. 32 AWG, tinned, soft-copper strands formed into a braid or approved equivalent foil. Shielding coverage on conductors is not less than 80 percent.
- E. Cabling listed and labeled for plenum installation.
- F. Provide documentation for each cable which can be stored and accessed.

3.1 SUBMITTALS

3.1.1 Submittals required for government review

- A. Submittal requirements are outlined in [Division 01] [PWS SOW] [____]
- B. [Product Information must include manufacturer's installation instructions, sizing (including required clearance for access and maintenance), utility requirements, isometric drawings, tagged floorplans showing placement for count accountability and accessories/options/consumables list.]
- C. All submittals require Government approval prior to procurement. Submit all listed items herein, with information sufficient to show full compliance with the criteria. Submit all product selections for review and approval, including but not limited to materials, finishes, colors, options, accessories, and complimentary products. Provide for review all warranties and service contracts and any available extended warranty or service options.
- D. Samples: Furnish material samples and full range of color selection options for all items that offer material and color selections.
- E. Submit and highlight all applicable options for Government review for all items which optional accessories are provided.
- F. [Joint Interoperability Test Command (JTIC) Approval Documentation.]

3.2 QUALITY ASSURANCE

3.2.1 Materials and Equipment

- A. Materials and equipment must be standard products of a manufacturer regularly engaged in the manufacture of products which are of a similar material, design, and workmanship and are offered for sale on the commercial market through advertisements, manufacturer's catalogs, or sales brochures. The products must have been in commercial or industrial use under similar circumstances and of similar size for 2 years prior to selection for approval/procurement. Products must be supportable for at least three years after government acceptance.

3.2.2 Alternative Service Record

A. Products having less than a 2-year field service record will be acceptable if a certified record of the manufacturer's factory or laboratory tests demonstrating performance compliance is provided to the Contracting Officer.

3.2.3 Service Support

A. Equipment items must be supported by service organizations located near the equipment installation, able to service the equipment on a regular basis and respond to emergency calls throughout the warranty period.

3.2.4 Manufacturer's Nameplate

A. Each item of equipment must have an attached nameplate that is securely affixed in a conspicuous space. A nameplate listing only the name of the distributing agent is not acceptable. The nameplate must contain the following fields in English:

1. Manufacturer's name and address
2. Model and Serial Number
3. Item's utility ranges and/or capacities
4. Voltage, amperage, and applicable Underwriters Laboratory (UL) or Conformité Européenne (CE) rating if electrically powered
5. Date of manufacture

3.2.5 Factory Inspection

A. Arrange and perform all quality control and quality assurance inspections required by the technical sections of the criteria, unless otherwise specified. Report these inspections in the daily report to the Government inspector.

3.2.6 Product Qualifications

A. The products specified in the technical sections of this criteria establish standards for each item.

3.2.7 Design Parameters

A. It is not the intention of this Criteria to limit consideration to products of specific manufacturers. The product standards establish the characteristics for which submitted items of equipment will be reviewed and approved by the Government. Equipment furnished must meet each of the following parameters specified in the technical sections:

1. Size of equipment
2. Function of equipment
3. Standard and listed accessories and options
4. Equipment controls and performance of equipment
5. Construction of equipment
6. Finish

3.3 STANDARDS DEVIATIONS

3.3.1 Reporting and Submission for Approval

A. Submit for approval a record of deviations from the standards listed in section (3.2.7.A.) established for each specified product, before ordering equipment.

3.4 DELIVERY, STORAGE AND PROTECTION

3.4.1 Packaging and Transporting

A. Each unit of equipment must be placed in a substantial shipping container or crate for safe transportation to final destination. The shipping container or crate for heavy equipment must be on skid construction to facilitate handling by lift equipment.

3.4.2 Packing List

A. Clearly and legibly indicate on exterior of each container or crate the shipping address and a brief description of contents. Fasten to outside of container a packing list and complete instructions for uncrating equipment and setting it in place. Protect such information in a weatherproof envelope.

3.4.3 Protection

- A. Properly protect all materials and equipment from injury and damage during storage, installation, and acceptance.

3.5 INSTALLATION, VERIFICATION AND ACCEPTANCE TESTING

3.5.1 Qualifications of Installers and Inspectors

- A. If required by product warranty, use installers that are approved and licensed by the manufacturer. When required to complete installation, all electricians and plumbers used must be bonded and licensed in the project's jurisdiction.
- B. [Company specializing in installing the products specified in this section must have a minimum 5 years of documented experience.]
- C. [Company specializing in installing the products specified in this section must be within 200 miles or 4 hours travel time.]

3.5.2 Installation, Operation, Testing and Certification

- A. Products must be delivered in manufacturer's original packaging with manufacturer's installation instructions. Include clearly marked project reference.
- B. Prior to installation, thoroughly examine the equipment, materials, and components for both visual defects and conformance with criteria.
- C. Install all equipment in compliance with manufacturer's written instructions and installation procedures.
- D. After installation, the equipment must be inspected and tested under operating conditions. If the equipment fails an inspection or test, such defects/failures must be corrected. Upon correction of defects/failures, inspect and retest all affected functions related directly and indirectly to the defect or failure. Corrections, replacement, and retesting must be made at no additional expense to the Government.
- E. Provide all items necessary to make equipment fully functional.
- F. Provide appropriately trained personnel to energize, commission, inspect, electrical safety check, calibrate, certify, and provide all required technical testing for equipment and systems. Contractor must provide documentation, test reports and certification documentation attesting that the equipment is properly installed, functional, safe, calibrated, and ready for its intended use.
- G. An equipment item will be considered defective if it cannot be made to meet all established criteria consistent with the activities listed in section (F).
- H. Provide two sets of special tools, software, and any other item/s for each equipment [item] [item type] if required for maintenance and/or future reconfiguration of the item.
- I. Contractor to supply all start-up supplies for medical equipment for a fully operational installation. Contractor must supply to the Government a listing of all needed supplies for ongoing equipment operation for each item of equipment requiring additional supplies for operation.
- J. Engage a factory-authorized service representative to train Government's staff and maintenance personnel to adjust, operate, and maintain medical equipment.
- K. [Confirm functionality of required interfaces to other systems and networks.]

3.6 WARRANTY

3.6.1 Minimum Requirements

- A. Warranty requirements are outlined in [Division 01] [PWS SOW] [____].
- B. [Provide manufacturer's written warranty for all items listed. Provide warranty for a minimum of (1) year against defects in materials and workmanship. Warranty must provide for material, labor and all associated replacement and/or repair costs required to provide for a fully operational equipment replacement or repair. Submit manufacturers and installers standard service contract beyond the warranty period for Government review. Warranty must be transferrable to the final owner without risk of being voided. All warranty certification and documentation must be provided to the final owner after date of acceptance.]
- C. Provide routine warranty service in accordance with manufacturer's warranty requirements, for a period of [12 months (minimum)] [____] after the open for business date. Perform work during regular working hours. Perform

service only by factory trained personnel. Maintain a maintenance log of all service orders performed during the warranty period.

3.7 OPERATIONS AND MAINTENANCE (O & M)

3.7.1 Provide the following to the final owner

- A. Provide O & M data for all FFE-LVS as outlined in [Division 01] [PWS SOW] [____].
- B. Upon completion of equipment installation, furnish [two (2)] copies of operators/service/maintenance manuals for each type of equipment which will require service or maintenance
- C. Each manual must contain operating instructions and information required for performing periodic maintenance on the equipment. Each service manual must include an illustrated parts breakdown which identifies each part of the unit with manufacturer's part number, wiring diagrams, and a list of necessary service parts, tools, and equipment needed to support maintenance requirements.
- D. Accessory Catalogs: Upon completion of the Project, furnish two copies of the manufacturer's catalogs containing optional accessory items available for all equipment relative to the procured equipment/system delivered herein.
- E. Provide instruction video for cleaning and maintenance, when available.
- F. Provide cleaning requirements for all items to prevent void of warranty.
- G. [Provide contact information for Repair Technician or Emergency Repair Company]
- H. Provide contact information to [Logistics, Pharmacy, Laboratory, and Biomedical Equipment Services.]
- I. Train designated staff in the operation and maintenance of the provided equipment/system. Provide two training sessions for equipment/system users and two training sessions for maintenance personnel scheduled to accommodate shift work. [Provide training certificates that can be executed up to eleven months after the system is installed, in order to provide a refresher course for each group of trainees.] Provide DVD copy of the training with the O & M data.

--End of Section--