AMENDMENT OF SOLICITATION/MODIFICATION OF CONTRACT	1. CONTRACT ID CODE	PAGE OF PAGES
		1 2

2. AMENDMENT/MODIFICATION NO.	3. EFFECTIVE DATE	4. REQUISITION/PURCHASE	5. PROJECT NO. (If applicable)
W9127826RA012-0008	16 JUN 2026		MEF22007

6. ISSUED BY CODE	7. ADMINISTERED BY(If other than item 6) CODE
USACE - Mobile District 100 Canal Street Mobile, AL 36602	

8. NAME AND ADDRESS OF CONTRACTOR (No., street, county, State and ZIP code)	☒	9A. AMENDMENT OF SOLICITATION NO. W9127826RA012 9B. DATED (SEE ITEM 11) 16 MARCH 2026
	☐	10A. MODIFICATION OF CONTRACT/ORDER NO. 10B. DATED (SEE ITEM 13)

CODE FACILITY CODE

11. THIS ITEM ONLY APPLIES TO AMENDMENTS OF SOLICITATIONS

☒ The above numbered solicitation is amended as set forth in item 14. The hour and date specified for receipt of Offers ☐ is extended, ☒ is not extended. Offers must acknowledge receipt of this amendment prior to the hour and date specified in the solicitation or as amended, by one of the following methods: (a) By completing items 8 and 15, and returning copies of the amendment; (b) By acknowledging receipt of this amendment on each copy of the offer submitted; or (c) By separate letter or telegram which includes a reference to the solicitation and amendment numbers. **FAILURE OF YOUR ACKNOWLEDGEMENT TO BE RECEIVED AT THE PLACE DESIGNATED FOR THE RECEIPT OF OFFERS PRIOR TO THE HOUR AND DATE SPECIFIED MAY RESULT IN REJECTION OF YOUR OFFER.** If by virtue of this amendment you desire to change an offer already submitted, such change may be made by telegram or letter, provided each telegram or letter makes reference to the solicitation and this amendment, and is received prior to the opening hour and date specified.

12. ACCOUNTING AND APPROPRIATION DATA *(if required)*

13. THIS ITEM APPLIES ONLY TO MODIFICATIONS OF CONTRACTS/ORDERS, IT MODIFIES THE CONTRACT/ORDER NO. AS DESCRIBED IN ITEM 14.

☐	A. THIS CHANGE ORDER IS ISSUED PURSUANT TO: (Specify authority) THE CHANGES SET FORTH IN ITEM 14 ARE MADE IN THE CONTRACT ORDER NO. IN ITEM 10A
☐	B. THE ABOVE NUMBERED CONTRACT/ORDER IS MODIFIED TO REFLECT ADMINISTRATIVE CHANGES (such as changes in paying office, appropriation date, etc.) SET FORTH IN ITEM 14, PURSUANT TO AUTHORITY OF FAR 43.103(b)
☐	C. THIS SUPPLEMENTAL AGREEMENT IS ENTERED INTO PURSUANT TO AUTHORITY OF:
☐	D. OTHER (Specify type of modification and authority)

E. IMPORTANT: Contractor ☐ is not, ☐ is required to sign this document and return copies to the issuing office.

14. DESCRIPTION OF AMENDMENT/MODIFICATION (Organized by UCF section headings, including solicitation/contract subject matter where feasible)

The subject solicitation for: **LRSO HARDWARE SOFTWARE DEVELOPMENT FACILITY EGLIN AIR FORCE BASE, FLORIDA**

Is modified in the following: **REFER TO THE ENCLOSED REVISED SPECIFICATIONS FOR AMENDMENT NO. 0008**

Except as provided herein, all terms and conditions of the document reference in item 9A or 10A, as Heretofore changed, remains unchanged and in full force and effect.

15A. NAME AND TITLE OF SIGNER (Type or print)		16A. NAME AND TITLE OF CONTRACTING OFFICE (Type or print)	
15B. CONTRACTOR/OFFEROR (Signature of person authorized to sign)	15C. DATE SIGNED	16B. UNITED STATES OF AMERICA BY (Signature of contracting officer)	16C. DATE SIGNED

PART I - REVISIONS MADE BY ADDED AND/OR REPLACEMENT PARAGRAPHS/PAGES/SECTIONS

The items listed below are to be replaced by the corresponding added and/or revised paragraphs/pages or sections. Added and/or revised paragraphs/pages or sections are indicated by a note in bottom right-hand corner of each paragraph or page. Added sections are hereby made a part of the contract and are to be inserted in the specification in the proper numerical/alphabetical sequence.

Within the specifications, deletions from the specifications are indicated by strikethrough, e.g.: ~~deletions are marked with strikethrough~~ and additions to the specifications including revisions/substitutions are indicated in bold, italic and underlined, e.g.: ***additions are indicated thus.***

SECTION	Corresponding Added or Revised Paragraph Page, and/or Section
Volume 2	
13 49 20.00 10	Revised Paragraphs 1.3.6.1 as indicated herein.

Encl as stated:
Revised pages of the specifications as indicated in Part I.

SECTION 13 49 20.00 10

RF SHIELDING
10/07

PART 1 GENERAL

Amendment 0002
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1.1 REFERENCES

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

ASTM INTERNATIONAL (ASTM)

ASTM A36/A36M	(2019) Standard Specification for Carbon Structural Steel
ASTM A123/A123M	(2024) Standard Specification for Zinc (Hot-Dip Galvanized) Coatings on Iron and Steel Products
ASTM A568/A568M	(2019a) Standard Specification for Steel, Sheet, Carbon, Structural, and High-Strength, Low-Alloy, Hot-Rolled and Cold-Rolled, General Requirements for
ASTM A653/A653M	(2023) Standard Specification for Steel Sheet, Zinc-Coated (Galvanized) or Zinc-Iron Alloy-Coated (Galvannealed) by the Hot-Dip Process
~~ASTM B545~~	~~(2022) Standard Specification for Electrodeposited Coatings of Tin~~

INSTITUTE OF ELECTRICAL AND ELECTRONICS ENGINEERS (IEEE)

IEEE 142	(2007; Errata 2014) Recommended Practice for Grounding of Industrial and Commercial Power Systems - IEEE Green Book
IEEE 299	(2006; R 2012) Standard Method for Measuring the Effectiveness of Electromagnetic Shielding Enclosures

~~NATIONAL ELECTRICAL MANUFACTURERS ASSOCIATION (NEMA)~~

~~NEMA ICS 6~~	~~(1993; R 2016) Industrial Control and Systems: Enclosures~~

NATIONAL FIRE PROTECTION ASSOCIATION (NFPA)

NFPA 70	(2026) National Electrical Code
NFPA 77	(2024; ERTA 1 2023) Recommended Practice

	on Static Electricity
NFPA 80	(2022) Standard for Fire Doors and Other Opening Protectives
NFPA 80A	(2022) Recommended Practice for Protection of Buildings from Exterior Fire Exposures
NFPA 780	(2023) Standard for the Installation of Lightning Protection Systems

U.S. DEPARTMENT OF DEFENSE (DOD)

MIL-HDBK-419	(1987; Rev A) Grounding, Bonding, and Shielding for Electronic Equipments and Facilities Volumes 1 of 2 Basic Theory
MIL-STD-188-124	(1998; Rev B; Notice 2 1998; Notice 3 2000; Notice 4 2013) Grounding, Bonding and Shielding for Common Long Haul/Tactical Communications Systems, Including Ground Based Communications - Electronics Facilities and Equipments

UNDERWRITERS LABORATORIES (UL)

UL 486A-486B	(2018; Reprint Jul 2023) UL Standard for Safety Wire Connectors
UL 1283	(2017) UL Standard for Safety Electromagnetic Interference Filters

1.2 SUBMITTALS

Government approval is required for submittals with a "G" designation; submittals not having a "G" designation are for Contractor Quality Control approval. When used, a designation following the "G" designation identifies the office that will review the submittal for the Government. Submittals with an "S" are for information only and for use as specified in Section 01 33 29 SUSTAINABILITY REQUIREMENTS AND REPORTING. Submit the following in accordance with Section 01 33 00 SUBMITTAL PROCEDURES:

SD-02 Shop Drawings

Installation; G

Approved Drawings; G

SD-03 Product Data

RF Shielding System; G

Installation; G

Quality Control Plan; G

Qualifications; G

RF Shielded Doors; G

~~Filter Assemblies; G~~

Penetrations; G

SD-10 Operation and Maintenance Data

Operating and Maintenance Manuals; G

Service Organization; G

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Amendment 0002

1.3 QUALITY ASSURANCE

Amendment 0002
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1.3.1 Shop Drawings

Provide fully coordinated installation and approved drawings including the complete integrated shielded enclosure systems. Provide the following integrated items including but not limited to: all steel shapes, steel deck, foil membrane systems, ~~filters,~~ doors, and penetrations. Detailed drawings showing location, number, and method of penetrating the shielding material shall be submitted. Drawings shall show erection details and sequence of erection.

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Amendment 0002

1.3.2 Penetration Schedule

The penetration schedule shall list each penetration of the RF Shield made through the walls, floors, roofs, and ceiling. Each listed penetration shall have a unique number. Each listed penetration shall have a brief description (e.g., conduit, pipe, ductwork, structure, etc.)

1.3.3 Product Data

Provide Shielding system product data including manufacturer's data, catalog cuts, and printed documentation regarding the work for the shielding system. Products requiring submittals include, but are not limited to doors, windows, foil membrane system, bronze wool, and conductive silicone.

1.3.4 RF Shielding Specialist (RSS) and System Coordinator

Work performed under this section shall be supervised and inspected by the RSS as generally defined in paragraph RF Shielding Specialist (RSS) and System Coordinator above.

1.3.5 RSS Report

The RSS shall submit RF installation reports that include photographs, documents indicating locations photographs occurred, and a description documenting materials and methods use to construct RF assembly. Document

all systems to be covered by concrete or other construction. All photographs shall be taken by the Government's photographer and note locations photos shall be taken for the reports. Every 2 weeks the RSS shall create a RF shielding report to be reviewed by the Government's field representative for approval and then forwarded to the CTTA.

1.3.6 RF Shielding Specialists, Installers and Testing Specialists

Provide the name and background qualifications of individuals who will be responsible for installation, supervision, and testing of the shielding systems on this project. Shielding and testing specialist credentials shall include a bachelor's degree in science or engineering and post-degree training and experience with RF shielding. The RSS shall be a person familiar with construction work and the work interactions among multiple trades. The RSS shall have 2 years of "foreman" type experience.

Amendment 0008
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1.3.6.1 Testing Experience

The testing specialist must have experience during the previous 5 years in ~~shielded enclosure leak detection system (SELDS),~~ IEEE 299, and other methods of shielded enclosure testing.

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Amendment 0008

1.3.6.2 Work Experience

Provide RF shielded system by an experienced firm or individual that has been regularly and successfully engaged in the installation, supervision, and/or testing of equivalent RF shielded systems for at least the previous 5 years. The principal work of this firm or individual must be the satisfactory installation and construction of RF shielded protection systems. Include experience such as achieving specified requirements for shielded system attenuation and maintainability of attenuation levels on work performed.

1.3.6.3 Project Experience

Furnish a project experience list on projects of similar scope which have been completed during the previous 5 years. Include project completion dates and the name and telephone number of the user and/or owner of each project. Indicate project experience for installers such as installation responsibilities, performance, materials, and methods used. Project experience for the shielding specialist must indicate the responsibilities performed. Project experience for the testing specialist must indicate the test methods performed.

Amendment 0002
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1.3.7 ~~Filter and~~ Electrical Work Requirements

Perform ~~filter and~~ electrical work in compliance with NFPA 70, UL 486A-486B, and UL 1283. The label and listing of the Underwriters Laboratories or other nationally recognized testing laboratory will be acceptable evidence that the material or equipment conforms to the applicable standards of

that agency. In lieu of the label or listing, a certificate may be furnished from an acceptable testing organization adequately equipped and competent to perform such services. State that the items have been tested and that they conform to the specified standard.

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Amendment 0002

1.3.8 Field Samples

Provide field samples for the following: RF shielding foil membrane system and tape, shielding fasteners, piping, duct, conduit penetrations, and any other element contributing to the continuation of the RF shielding system. These samples shall remain on the construction site in a readily accessible location for the duration of the construction for review and reference by contractor and Government personnel.

1.3.9 Pre-Installation Meeting

Hold a pre-installation meeting with the RSS, Contracting Office, Government CTTA, subcontractors and installers working in, on, or near the RF shield. Discuss coordination requirements and instructions to ensure the integrity of the RF shield.

Items to discuss, but are not limited to, at the RF pre-installation meeting:

a. Pre-construction meeting.

b. Mock-up inspection.

c. RF Construction inspection and approval process, including first inspection by CTTA and any reoccurring inspection required.

d. Accreditation testing as prerequisite for substantial completion.

1.4 RF MOCK-UP

RF mock-up shall include materials and systems noted on the construction documents and systems called for during the RF pre-construction meeting. Mock-up shall be constructed at designated areas and approved by the CTTA. Mock-up shall include, but is not limited to, the following systems that make up the overall assembly to be approved by the CTTA: Perimeter wall RF foil membrane system, seams between foil membrane modules, connection of wall and ceiling cap, connection of wall and roof, tape at penetrating steel beams, pope and conduit penetrations, duct work penetrations, conductive sealant and gasket locations, and any other transitions in RF shielding between elements.

1.5 DELIVERY, STORAGE, AND HANDLING

Protect equipment delivered and stored from excessive humidity and temperature variation, dirt, and other contaminants.

Amendment 0002

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1.6 PROJECT/SITE CONDITIONS

Perform welding of RF shielding material and sheet steel at an ambient temperature of 50 degrees F minimum to 90 degrees F. Do not install shielding until the building has been weather enclosed. ~~Do not perform sheet steel welding in direct sunlight.~~

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Amendment 0002

1.7 MAINTENANCE

1.7.1 Maintenance Supplies and Procedures

Provide maintenance supplies sufficient for a 3 year period or 50,000 open-close cycles, whichever is greater, for each RF shielded door. Prominently display maintenance instructions required to maintain the door through the cycle count nearby.

1.7.2 Extra Materials

1.7.2.1 RF Shielded Doors

Furnish one set RF gaskets (if used) for each hinged RF shielded door provided. In addition, provide one set of manufacturer recommended and Contracting Officer approved spare parts for RF shielded doors of each style installed.

1.7.2.2 Tools

Furnish one full set of tools that are required to maintain the doors and are not typically available from tool vendors. Furnish environmentally safe lubricants, cleaning solvents, or coatings in sufficient quantities to last for 6 months.

1.7.2.3 Special Tools

Provide one set of special tools, calibration devices, and instruments required for operation, calibration, and maintenance of the equipment.

Amendment 0002
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1.7.3 Operating and Maintenance Manuals

Submit manufacturer's written instructions for operation and maintenance of RF Shielding system. Address all components and aspects of the RF shielding and include, but not be limited to, the following:

a. A complete set of assembly drawings to include penetration locations and installation details.

b. The construction specification on RF shielding.

c. Shield penetration schedule.

d. ***Not Used.*** ~~Power/signal filter schedule.~~

e. Test plan.

f. The prepared preventive maintenance instructions for periodic inspection, testing and servicing, lubrication, alignment, calibration, and adjustment events normally encountered. Extract complex preventive maintenance events from or refer to detailed vendor or manufacturer data. Derive this information from an evaluation of engineering data considering local environmental conditions, manufacturer's recommendations, estimated operating life for the specific application and use of the equipment, and types of job skills available at the operating site.

g. Spare parts data approved and verified by the shielding specialist prior to submission. Include a complete list of recommended parts and supplies with current unit prices and source of supply.

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Amendment 0002

PART 2 PRODUCTS

2.1 SYSTEM REQUIREMENTS

Amendment 0002
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2.1.1 General

Provide shielded facility that meets or exceeds minimum attenuation decibel (dB) levels specified. The RF shielding system includes, but is not limited to, the following:

a. The RF shield foil membrane.

b. RF shielded doors for access into the facility.

c. Electrical and electronic penetrations of the shield.

d. ***Not Used.*** ~~RF filter/surge arrester assemblies, including their RF enclosures.~~

e. ***Not Used.*** ~~Special protective measures for mission-essential equipment outside the RF shield.~~

f. Structural penetrations.

g. Mechanical and utility penetrations (such as air ducts, gas, and water).

h. Instrumentation and control.

i. Equipment door/access panels.

j. Sufficient supervisory and/or quality control personnel onsite to supervise the installation crew and to conduct in-progress quality assurance tests.

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Amendment 0002

2.1.2 Factory Tests

Perform factory tests as specified. The Contracting Officer reserves the right to witness the specified factory tests. Notify the Contracting Officer at least 30 days before factory tests are scheduled to be performed. Include a detailed description of the test instrumentation and equipment, including calibration dates, a detailed description of the test procedure, and the recorded test data.

2.2 MATERIALS AND EQUIPMENT

2.2.1 Standard Products

Provide materials and equipment which are the standard products of a manufacturer regularly engaged in the manufacture of such products and essentially duplicate items that have been in satisfactory use for at least 2 years prior to bid opening. Support equipment by a service organization that is, in the opinion of the Contracting Officer, reasonably convenient to the site.

2.2.2 Nameplates

For each major item of equipment, secure a plate with the manufacturer's name, address, type or style, model or serial number, and catalog number to the item of equipment.

Amendment 0002
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2.2.3 Testability

~~Design and b~~Build equipment and materials of the shielding to facilitate testing and maintenance.

2.3 RF SHIELDING EFFECTIVENESS

Provide RF shielded enclosure complete with all ~~filters,~~ doors, and/or waveguides with the following minimum RF shielding effectiveness attenuation. Use minimum electromagnetic field attenuation of 50 dB from 10 MHz to 18 GHz.

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Amendment 0002

2.4 RF SHIELD FOIL MEMBRANE SYSTEM

2.4.1 Shielding for Opaque Walls

RF Shielding material shall be a heavy duty radiant barrier sheet comprised of a layer of woven polyethelene or foil back gypsum board. Film to be perforated to allow for water vapor permeability.

Tape for seams shall be conductive adhesive tape as recommended by manufacture for shielding purposes. General purpose construction adhesive for foil contact to gypsum wall board, sheathing, steel plate, steel shapes, door frames, and concrete surfaces shall be as recommended by manufacturer.

Amendment 0002

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2.4.2 Penetrations

Seal penetrations of the shield, including bolts or fasteners, with ~~puddle welds or~~ full circumferential RF materials. Provide structural penetrations including beams, columns, and other metallic structural elements with ~~continuously welded or brazed seams and joints~~ ***RF materials*** between the penetrating element and the shield. Nonmetallic structural elements are not allowed to penetrate the electromagnetic barrier.

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Amendment 0002

2.4.3 Floor Finish

Cover floor with Vapor permeable RF shielding.

2.5 RF SHIELDED DOORS

Amendment 0002

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2.5.1 General

Material in shielded doors and frames must be steel conforming to ASTM A36/A36M or ASTM A568/A568M and stretcher-leveled and installed free of mill scale. Use thicker metal where indicated or required for its use and purpose. Provide metal thresholds of the type for proper shielding at the floor. Provide fire rated shielded doors and assemblies meeting NFPA 80 and NFPA 80A requirements and bearing the identifying label of a nationally recognized testing agency qualified to perform certification programs. Provide RF shielded doors by a single supplier who has been regularly engaged in the manufacture of these items for at least the previous 5 years. Supply assemblies complete with a rigid structural frame, hinges, latches, and parts necessary for operation. Duplicate assemblies that have been in satisfactory use for at least 2 years. Provide door frame consisting of steel suitable for bolting to the surrounding structure and shield. Provide ~~RF filters,~~ RF waveguide penetrations for door systems, and miscellaneous material for a complete system. Provide nonsagging and nonwarping enclosure door. The RF shielded door must provide a shielding effectiveness listed in the shielding section.The RF shielded doors must be prepared to accept the necessary door hardware without compromising the RF shielding. See Section 08 71 00 DOOR HARDWARE for more information. The RF shielded doors must also meet the STC rating as scheduled, see Section 08 34 73 SOUND CONTROL ASSEMBLIES for more information.

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Amendment 0002

2.5.1.1 Electric Connectivity

Provide conductive door gasketing from the door to the door frame. Provide tape from the door frame and the RF shielding as required and shown on the drawings.

2.5.2 RF Shielded Door Factory Test

Provide test data on at least one shielded door of each type provided for the facility to verify that the RF shielded doors of the design supplied have been factory tested for compliance with this specification. Do not furnish test doors on the project. Submit test data reports in accordance with paragraph SUBMITTALS.

2.5.2.1 Radio Frequency Shielding Test

Factory test RF shielded door in accordance with the requirements of this specification both before and after the mechanical tests described above.

Amendment 0002
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2.6 ***NOT USED*** ~~ELECTROMAGNETIC FILTERS~~

~~Provide a filter for each power line penetrating the shielded enclosure. These lines include, but are not limited to, power lines. Enclose filters in metallic cases which protect the filter elements from moisture and mechanical damage. Ensure all external bonding or grounding surfaces are free from insulating protective finishes. Protect all exposed metallic surfaces against corrosion by plating, lead-alloy coating, or other means. The finish must provide good electrical contact when used on a terminal or as a conductor, have uniform texture and appearance, be adherent, and free from blisters, pinholes and other defects. Insertion loss in the stop band between the load side of the filter and the power supply side must be no less than the RF shielding attenuation specified. Each filter unit must be capable of being mounted individually and include one filter for each phase conductor of the power line and the neutral conductor. Include one filter for each conductor.~~

~~2.6.1 Enclosure~~

~~Mount filter units in an RF modified NEMA Type 1 enclosure in accordance with NEMA ICS 6. Make enclosures of corrosion resistant steel of 14 gauge minimum thickness with welded seams and galvanized bulkhead cover plates. Finish enclosure nonconductive surfaces with a corrosion-inhibiting primer and two coats of baked or finish enamel. The input compartment must house the individual line filters and the input terminals. Space live parts in accordance with NFPA 70. Use copper filter leads. Test filter enclosures for shielding effectiveness in accordance with IEEE 299 and Table I of this specification.~~

~~2.6.1.1 Filter Unit Mounting~~

~~Mount each filter unit individually in an enclosure containing one filter for each penetrating conductor. Attach one end of the individual filter case to the RF barrier plate between the two compartments to provide an RF tight seal between the rf barrier plate and the filter case. The terminals of the filters must project through openings in the RF barrier plate into the inner terminal compartment. Attach the case of each filter to both the enclosure and to the barrier plate to prevent undue stress being applied to the RF seal between the filter case and the RF barrier plate. Individual filters must be removable from the enclosure. Like filters must be interchangeable.~~

~~2.6.1.2 Conduit Connections to Enclosures~~

~~Provide load terminal and input compartments without knockouts, and provide each compartment with weldable threaded conduit hubs. RF weld hubs circumferentially in place and size and locate as required for the conduits indicated.~~

~~2.6.1.3 Access Openings and Cover Plates~~

~~Provide enclosures with separate clear front access cover plates on terminal and power input compartments. Provide access cover plates which are hinged with RF gaskets and 3 inch maximum bolt spacing. Include thick cover plates and folded enclosure edges to prevent enclosure deformation, bolt spacers to prevent uneven gasket compression, and gasket mounting to facilitate replacement. All gasket contact areas must be tin-plated using the electrodeposited type I method in accordance with ASTM B545. Permanently fasten nuts and bolts to the enclosure by welding or captive attachments.~~

~~2.6.1.4 Operating Temperature~~

~~Provide filter assembly which is rated for continuous operation, with filters at rated voltage and full-load currents, in ambient temperatures from minus 55 to plus 65 degrees C (measured outside the RF filter enclosure). Use filter components that are suitable for continuous full load operation at a temperature from minus 55 to plus 85 degrees C.~~

~~2.6.1.5 Short Circuit Withstand~~

~~Label and build filters to have standard minimum short circuit withstand ratings as follows:~~

~~FILTER RATED CURRENT, RMS AMPERE~~	~~SHORT CIRCUIT FULL LOAD AMPERES SYMMETRICAL~~
~~0-100~~	~~10,000~~
~~101-400~~	~~14,000~~

~~2.6.1.6 Filter Connections~~

~~Provide individual filters with prewired standoffs and solderless lugs. Provide hexagonal head bolt or screw type lugs conforming to UL 486A-486B. Space live parts in accordance with NFPA 70.~~

~~2.6.2 Internal Encapsulated Filters (Filter Units)~~

~~2.6.2.1 Filter Construction~~

~~Individual filters must be heavy-duty type sealed in a steel case. After the filter is filled with an impregnating or encapsulating compound, weld the seams. When a solid potting compound is used to fill the filter, the filters may be mechanically secured and sealed with solder. Use hermetically sealed impregnated capacitors, or vacuum impregnate the complete filter assembly. Fabricate individual filter cases of no less than 14 gauge thick steel and finish with a corrosion-resistant plating,or one coat of corrosion-resistant primer and two coats of finish enamel. Fill the filter with an impregnating or potting compound that is chemically inactive with respect to the filter unit and case. The~~

~~compound, either in the state of original application or as a result of having aged, must have no adverse effect on the performance of the filter. Use the same material for impregnating as is used for filling. Use copper filter terminals that can withstand the pull requirements specified and measured in accordance with paragraph RADIO FREQUENCY FILTERS.~~

~~2.6.2.2 Ratings~~

~~Provide filters in the current, voltage, and frequency ratings indicated on the drawings.~~

~~2.6.2.3 Voltage Drop~~

~~Voltage drop through the filter at operation frequency must not exceed 2 percent of the rated line voltage when the filter is fully loaded with a resistive load (unity power factor). Measure voltage drop in accordance with paragraph Voltage Drop Measurements.~~

~~2.6.2.4 Drainage of Stored Charge~~

~~Provide filters with bleeder resistors to drain the stored charge from the capacitors when power is shut off. Drain stored charge in accordance with NFPA 70.~~

~~2.6.2.5 Operating Temperature Range~~

~~Mount individual filters in the filter enclosure operating at full load amperage and rated voltage that do not exceed plus 185 degrees F based on an ambient temperature of 150 degrees F outside the filter enclosure.~~

~~2.6.2.6 Harmonic Distortion~~

~~Harmonics generated by the insertion of a filter must not increase line voltage distortion more than 2.5 percent when measured with a unity power factor in accordance with the paragraph RADIO FREQUENCY FILTERS.~~

~~2.6.3 Marking of Filter Units~~

~~Mark each filter case with the rated current, rated voltage, manufacturer s name, type of impregnating or potting compound, operating frequency, and model number. In addition, provide individual filter cases, the filter enclosures, and supply and load panelboards of filtered circuits marked by the manufacturer with the following: "WARNING: Before working on filters, terminals must be temporarily grounded to ensure discharge of capacitors. Attach nameplates and warning labels securely.~~

~~2.6.4 Minimum Life~~

~~Design filter assemblies for a minimum service life of 15 years. Submit filter schedule including voltage, amperage, enclosure type (low, high, band pass), location, cut-off frequency, and band pass frequencies.~~

~~2.6.5 Power and Signal Line Factory Testing~~

~~Submit factory test report data for each filter configuration, voltage, and amperage which shows the ability of filters to meet the specified requirements. Base filter test reports on prior tests of the same filter assembly design and components. Submit test data reports in accordance~~

~~with paragraph SUBMITTALS. Include the following in the test data:~~

~~a. Voltage Drop Measurements.~~

~~b. Insertion Loss Measurements.~~

~~c. Terminals.~~

~~2.6.5.1 Voltage Drop Measurements~~

~~Perform voltage drop measurements on filters with the components mounted in the filter assembly enclosure or mounted on a metal plate by the same holding method that will be used for mounting in the enclosure. Make measurements by using expanded scale-type meters.~~

~~2.6.5.2 Insertion Loss Measurements~~

~~Insertion loss measurements for power filters must have the following modifications. Install filters in the filter assembly enclosure. Operate load current power supply at the rated voltage of the filters and provide any current from no-load through rated full-load current. The rf signal generator must be a swept continuous wave (cw) source. Modify buffer networks to permit valid measurements over the entire frequency band on which insertion loss requirements are specified (14 kHz-1 Ghz). Provide receiver or network analyzer capable of operating over the entire frequency band on which insertion loss requirements are specified (14 kHz-1 Ghz). Use adequate sensitivity to provide a measurement dynamic range at least 10 dB greater than the insertion loss requirement. Use resistive load impedance which is capable of dissipating the rated full-load filter current. Make insertion loss measurements at 20 percent, 50 percent, and 100 percent of the filter full-load operating current. Do not perform load insertion loss measurements over the frequencies defined in the RF shielding effectiveness attenuation requirements for power filters. Perform load to source testing for TEMPEST.~~

~~2.6.5.3 Terminals Pull Test~~

~~The purpose of this test is to determine whether the design of the filter terminals can withstand the mechanical stresses to which they will be subjected during installation or disassembly in equipment. Perform testing with the components mounted in the filter assembly enclosure or mounted on a plate by the same holding method that will be used for mounting in the enclosure. Apply a force of 20 pounds to the terminal. The point of application of the force and the force applied must be in the direction of the axes of the terminations. Apply force gradually to the terminal and maintain for a period of 5 to 10 seconds. Check the terminals before and after the pull test for poor workmanship, faulty designs, inadequate methods of attaching of the terminals to the body of the part, broken seals, cracking of the materials surrounding the terminals, and the changes in electrical characteristics such as shorted or interrupted circuits. Measurements are to be made before and after the test.~~

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Amendment 0002

2.7 PENETRATION PLATES

Provide penetration plates that are minimum 1/4 inch thick and sized as

shown on the drawings. The penetration plate must overlap the shield penetration cutout dimension by a minimum of 6 inch on each side. Bolt the penetration plate to the shield with bolts 3 inch on center.

2.8 GALVANIZING

Galvanizing, when practical and not otherwise indicated, must be hot-dipped processed after fabrication. Galvanizing must be in accordance with ASTM A123/A123M, or ASTM A653/A653M, as applicable. Exposed fastenings must be galvanically compatible material. Avoid electrolytic couples and dissimilar metals that tend to seize or gall.

2.9 SECURITY BARS

Provide Security bars for all ventilation penetration exceeding 96 square inches or with any dimension 6 inches or greater. Submit detailed drawings of security bars. Security bars shall be a minimum of 1/2 inch diameter hardened steel, welded vertically and horizontally 6 inches on center; a deviation of 1/2 inch in vertical and/or horizontal spacing is permissible. An access door shall be installed inside the secure perimeter to allow visual inspection of the bars.

2.10 DUCTWORK PENETRATIONS

RF-shielded penetrations of HVAC ductwork shall be equipped with honeycomb waveguide vents that provide minimum electric field and plane wave attenuation indicated in paragraph RF SHIELDING EFFECTIVENESS. Waveguide construction shall be brass or steel core with a galvanized steel duct flange or sleeve as indicated. Waveguide connection to the duct shall be made via non-metallic flex connector so as not to defeat the grounding requirement. The ductwork to be installed inside of the enclosure shall be connected directly to the waveguide vent and as indicated. Frame the rough openings larger in both dimensions than the required sizes. Static pressure drop through waveguide assembly shall not exceed 0.1 inches w.g. at air velocity of 1,200 feet per minute.

PART 3 EXECUTION

3.1 EXAMINATION

After becoming familiar with all details of the work, verify dimensions in the field, and advise the Contracting Officer of any discrepancy before performing the work.

3.2 INSTALLATION

3.2.1 Coordination

The RF shielding installer must instruct other trades in the presence and with the direction of the Government representative, in advance of the RF shielding system installation, to ensure that all individuals are aware of the critical installation requirements. Submit manufacturer's data, catalog cuts, and printed documentation regarding the work. Provide cleaners, solvents, coatings, finishes, physical barriers, and door threshold protectors as required to protect the shielding system from corrosion, damage, and degradation. Oblation approval of the shielding installation plan before construction begins.

3.2.2 Verification

Before, during, and after the RF shielding and penetration protection subsystem installation, the shielding specialist must verify and approve the installation for compliance with the specifications. Provide materials and methods, shop drawings, and other items for the shielding subsystem bearing an approval stamp of the shielding specialist. Provide compliance notification to the Contracting Officer before materials are installed or methods performed.

Amendment 0002
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3.2.3 Inspection

During and after RF shielding and penetration protection subsystem installation, including ~~RF filters and~~ waveguides, a qualified shielding specialist must inspect the installation for compliance with the specifications. Complete the inspection before a finish or concrete topping coat is installed.

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Amendment 0002

3.2.4 Manufacturer's Services

Provide the services of a manufacturer's representative who is experienced in the installation, adjustment, and operation of the equipment specified. Supervise the installation, adjustment, and testing of the equipment.

3.2.5 Posting Framed Instructions

Post framed instructions containing wiring and control diagrams under glass or in laminated plastic. Frame condensed operating instructions, prepared in typed form, as specified above and post beside the diagrams before acceptance testing of the system.

3.3 RF SHIELD FOIL MEMBRANE SYSTEM INSTALLATION

Install the RF shielded foil membrane system in accordance with this specification, the drawings, and the recommendations of the manufacturer and EM shielding specialist. Handle and install shielding foil membrane system without damage. Penetrations of the shield, other than those indicated on the drawings, will not be permitted, including fasteners and mounting bolts, without prior written authorization from the RSS and CTTA.

3.3.1 Surface Preparation

Clean and buff contacting surfaces to ensure firm contact with shielding foil membrane system. Remove all sharp edges on corners, edges, and transition points where the membrane is applied to ensure the membrane is not punctured during or after the installation.

3.3.2 Installation on Opaque Surfaces

Unroll RF shielding and cut to appropriate length. Cut 12 inches longer than surface to be covered. Apply to gypsum wall board, sheathing, steel plate, steel shapes, and door frame assemblies with approved adhesive or

manufacturer conductive adhesive tape. Overlap joints by a minimum of 6 inches. Seal all seams and edges with manufacturer conductive adhesive tape. Extend RF shielding to top of wall and at least 6 inches on to underside of ceiling cap. Extent RF shielding to bottom of wall and at least 6 inches on to floor RF shielding. Provide penetrations as detailed on drawings with a minimum of 6 inches overlap.

3.4 SHIELDING PENETRATION INSTALLATION

Install penetrations in accordance with requirements of the penetration schedule and coordinate with system installation.

a. Where penetrations are encountered (i.e., conduits, pipes, structural steel members, HVAC, etc.) conductive tape shall be installed from the duct/pipe surface onto the foil shielding for 6 inches onto both surfaces. Provide grounding wires on the secure side of the duct/pipe to ground bar within room.

b. A distance of 8 inches minimum shall be maintained between each penetration and adjoining penetrations, walls, floor, ceiling or structural elements. This distance is required for shielding to penetration decoupage sealing.

c. Non-metallic piping (i.e., plastic drain lines, chemical piping, etc.) shall be covered with conductive foil tape for a distance of 6 inches from the pipe surface onto the foil shielding. No grounding wires are required.

d. All conduits and pipes shall be rigidly fastened at the point of shielding penetration, mounting hardware to be placed on unshielded side (use conduit strap, channel, studs, blocking, etc., as required).

3.5 PENETRATION INSPECTION

Request and receive the Construction Engineer's approval of all penetrations. Failure to receive this approval may be cause for rejection and subsequent replacement at the Contractor's expense.

3.6 FIELD QUALITY CONTROL

Develop a quality control plan to ensure compliance with contract requirements; maintain quality control records for construction operations required under this section; and submit the quality control plan to the Contracting Officer. Furnish a copy of testing records, as well as the records of corrective actions taken. Perform in-progress and final acceptance testing of RF shielding and penetration protection system work as specified. Correct deficiencies at no additional cost to the Government. Maintain legible copies of the daily inspection reports by the shielding specialist at the project site, and deliver copies of the Construction Quality Control Report to the Contracting Officer on the third workday following the date of the report. Include the type of work being performed during the report period and locations, type of testing, deficiencies, corrective actions, unsolved problems, and recommendations to assure adequate quality control in the daily inspections. Attach results of inspections and tests performed in accordance with this specification to the daily Construction Quality Control Report.

3.7 FIELD TRAINING

Provide a field training course for designated operating and maintenance staff members. Provide training for a total period of 8 hours of normal working time and start after the system is functionally complete but prior to the final acceptance test. Cover all the items contained in the Operating and Maintenance Manuals.

3.8 SHIELDING QUALITY CONTROL

Integrate the Contractor's organizational structure for shielding quality control into the jobsite management. Perform testing by an independent testing firm.

Amendment 0002
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3.8.1 Hardness Critical Item Schedule

Identify hardness critical items during the detail drawing submittal period. These items are those components and/or construction features which singularly and collectively provide specified levels of HEMP protection, such as the RF shield, surge arresters, RF shielded doors, shield welding, ~~electrical filters,~~ honeycomb waveguides, and waveguides-below-cutoff.

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Amendment 0002

3.8.1.1 Performance Test Plan by Independent Testing Firm

Independent testing firm to submit a performance test plan for Contracting Officer approval. Accomplish testing in three parts: (1) in-progress; (2) initial shielded enclosure effectiveness; and (3) final acceptance, shield enclosure effectiveness. Include in the test plan equipment listings (including calibration dates and antenna factors) and the proposed test report format. Also include specific test dates and durations during the overall construction period so that the Contracting Officer may be scheduled to observe the testing and so that repairs may be made to the shield and retests conducted. This separate testing schedule for the RF enclosure must show the points, during construction, when it begins and ends as well as a day-by-day test schedule. Indicate proposed dates and duration of lowest and highest frequency tests so that the Contracting Officer may be available for these final acceptance tests. Identify a test grid and provide plan for correlation of that grid to the structure.

3.8.1.2 Test Reports by Independent Testing Firm

Include the method of testing, equipment used, personnel, location of tests, and test results. Submit daily reports of results of each test performed on each portion of the shielding system to the Contracting Officer within 3 working days of the test. Clearly identify location of the area tested. Identify leaks detected during testing with sufficient accuracy to permit relocation for testing in accordance with test procedures. Submit reports of testing to the Contracting Officer with required certification by the testing agency representative or consultant. Submit three reports (in-progress test report, initial test report, and final acceptance test report) in accordance with the format

described below.

Cover Page:
A cover page is required.

Administrative Data:
Test personnel.
Contract number.
Date of test.

Authentication:
Contractor personnel responsible for performance of the tests and witnessing organization or representatives.

Contents:
Shielded facility description.
Nomenclature of measurement equipment.
Serial numbers of measurement equipment.
Date of last calibration of measurement equipment.
Type of test performed.
Measured level of reference measurements and ambient level at each frequency and test point.
Measured level of attenuation in decibels at each frequency and test point.
Dynamic range at each test frequency and test point.
Test frequencies.
Location on the shielded enclosure of each test point.
Actual attenuation level at each test point.

Conclusions:
Include results of the tests in brief narrative form in this section.

Number of Copies of the Report:
Three copies.

3.9 GROUNDING

The contract drawings indicate the extent and general arrangement of the shielded enclosure grounding system. The grounding methods must be an equipotential grounding plane method in accordance with UL 1283, NFPA 70, NFPA 77, NFPA 780, IEEE 142, MIL-STD-188-124, and MIL-HDBK-419. For additional facility grounding requirements, see Section 26 20 00 INTERIOR DISTRIBUTION SYSTEM.

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