Preparing Activity: NAVFAC

Superseding
UFGS-08 34 49.00 20 (November 2021)

UNIFIED FACILITIES GUIDE SPECIFICATIONS

References are in agreement with UMRL dated July 2023
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SECTION 08 34 49.00 20

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11/22

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SECTION 08 34 49.00 20

HEMP SHIELDED DOOR
11/22

NOTE: This guide specification covers the requirements for furnishing and installing high-altitude electromagnetic pulse (HEMP) shielded door.

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).

NOTE: Show the following information on the project drawings:

a. Location of HEMP shielded door.

b. Location of alarm panel.

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.
****

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.

AMERICAN WELDING SOCIETY (AWS)

AWS D1.1/D1.1M	(2020; Errata 1 2021) Structural Welding Code - Steel
AWS D9.1/D9.1M	(2018) Sheet Metal Welding Code

ASTM INTERNATIONAL (ASTM)

ASTM A36/A36M	(2019) Standard Specification for Carbon Structural Steel
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 A1008/A1008M	(2021a) Standard Specification for Steel, Sheet, Cold-Rolled, Carbon, Structural, High-Strength Low-Alloy, High-Strength Low-Alloy with Improved Formability, Solution Hardened, and Bake Hardenable
ASTM A1011/A1011M	(2023) Standard Specification for Steel Sheet and Strip, Hot-Rolled, Carbon, Structural, High-Strength Low-Alloy, High-Strength Low-Alloy with Improved Formability, and Ultra-High Strength
ASTM B194	(2022) Standard Specification for Copper-Beryllium Alloy Plate, Sheet, Strip, and Rolled Bar

INSTITUTE OF ELECTRICAL AND ELECTRONICS ENGINEERS (IEEE)

IEEE 299	(2006; R 2012) Standard Method for

	Measuring the Effectiveness of Electromagnetic Shielding Enclosures

NATIONAL FIRE PROTECTION ASSOCIATION (NFPA)

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 101	(2021; TIA 21-1) Life Safety Code

U.S. DEPARTMENT OF DEFENSE (DOD)

MIL-STD-188-125-1	(1998; Rev A; Notice 1 2021) High-Altitude Electromagnetic Pulse (HEMP) Protection for Ground-Based Facilities Performing Critical, Time-Urgent Missions, Part I Fixed Facilities

1.2 DEFINITIONS

1.2.1 Regularly Engaged

As it applies to the testing company is defined to mean that the testing company has successfully performed electromagnetic shielding attenuation (SA) test and shielded enclosure leak detection system (SELDS) tests at least [six] [_____] times in the last [two] [_____] years.

1.2.2 Independent

As it applies to the testing company is defined to mean that the company has no financial interest and not directly or indirectly part of the shielding Contractor, subcontractor, or general contractor QC organization.

1.2.3 Shielding Attenuation

As it applies to this section is defined as the shielding effectiveness. Shielding effectiveness at a test area for the purpose of this procedure is the ratio expressed in decibels (dB), of the received signal when the receiving antenna is illuminated by electromagnetic radiation in the test calibration configuration (no shield present) to the received signal through the electromagnetic barrier in the test measurement configuration. Assuming that antenna voltage is detected.

$$SE = 20 \log(Vc/Vm)$$

Where Vm is the measured signal at the test area and Vc is the calibration signal at the same frequency and transmitting antenna polarization. Shielding effectiveness values are test-method dependent and different values may be obtained when time-domain or other frequency-domain measurement techniques are used.

1.2.4 Corrections and Repair

Replacing existing defective part(s) with identical parts which are shown in approved shop drawings, parts list, catalog, and maintenance manual. This includes cleaning, adjustment, and tightening.

1.2.5 Modification

Adding new part(s) like pieces or extra row(s) of finger-stocks, gasket (all shapes and sizes), bronze wool, microwave absorber which are not shown in drawings, parts list, catalog, and maintenance manual.

1.3 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.

****

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:

SD-02 Shop Drawings

****

NOTE: Base typical installation of frames and HEMP shielded door(s) in accordance with manufacturer's installation drawings.

****

HEMP Shielded Door Installation; G[, [_____]]

Electric Connectivity; G[, [_____]]

Installation Details; G[, [_____]]

SD-03 Product Data

Shielded Door and Frame; G[, [_____]]

Hardware and Accessories; G[, [_____]]

Hinges; G[, [_____]]

Panic Hardware; G[, [_____]]

SD-06 Test Reports

Swinging Door Static Load Test; G[, [_____]]

Swinging Door Sag Test; G[, [_____]]

Door Closure Test; G[, [_____]]

Handle Pull Test; G[, [_____]]

Electromagnetic SA Test; G[, [_____]]

Electromagnet (EM) Shielded Door Tests; G[, [_____]]

Submit test reports for specified tests under paragraph SOURCE QUALITY CONTROL. Include as minimum, list of equipment used with calibration data, test point location, date, project title and location, location of signal source, dynamic range, noise floor, SA (required and actual), any repair performed, person performing the test and witness signature.

SD-07 Certificates

Certification of Welders; G[, [_____]]

Test compliance of HEMP shielded door; G[, [_____]]

SD-08 Manufacturer's Instructions

Test Plan; G[, [_____]]

Welding Procedure; G[, [_____]]

SD-10 Operation and Maintenance Data

****

NOTE: Designer should consult with the Engineering Service Center, Code 065, on DNA-TR-91-87 HM/HS Manual.

****

Hardness Maintenance and Hardness Surveillance (HM/HS) Manual, Data Package 3; G[, [_____]]

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

SD-11 Closeout Submittals

Final Acceptance Test

EM Shielded Door Tests

****
NOTE: Check with using agency, if test report needs to be classified [secret] [top secret].
****

Submit test reports for specified tests under paragraph FIELD QUALITY CONTROL. containing as a minimum, list of equipment used with calibration data, test point location, date, project title and location, location of signal source, dynamic range, noise floor, SA (required and actual), any repair performed, person performing the test and witness signature.[Test report is classified [secret] [top secret] [_____], therefore, the independent tester must have the necessary security clearance]. Log the test data for each test point on the form as the test progresses. Have the witness sign the data form at the end of each day.

1.4 QUALITY ASSURANCE

1.4.1 Qualifications

1.4.1.1 HEMP Shielded Door Manufacturer

Provide supervision and installation of work required under this section by the HEMP shielded door manufacturer who will have successfully manufactured and completed at least [3] [_____] similar HEMP shielded door projects of comparable size in the last [1] [_____] year.

1.4.2 Regulatory Requirements

Fire rated HEMP shielded door and assemblies must meet NFPA 80 and NFPA 80A requirements and bear the identifying label of a nationally recognized testing agency qualified to perform certification programs.

1.4.3 Certification of Welders

Before assigning welders to work covered by this section, submit the names of the welders to be employed, together with certification that each welder has passed the qualification tests in the process specified in AWS D1.1/D1.1M and AWS D9.1/D9.1M. Require welders to retake the tests when, in the opinion of the Contracting Officer, the work of the welder creates a reasonable doubt as to the proficiency of the welder. Make recertification of the welder to the Contracting Officer only after welder has taken and passed the required tests. The Contracting Officer may require specimens to be cut from any location in any joint for testing. Sections of welds found defective must be chipped, ground, or cut out to base metal, and properly rewelded before proceeding with the work. Should

[2] [_____] specimens cut from the work of welder show test strengths less than that of the base metal, it will be considered as evidence of negligence or incompetence and such welder must be permanently removed from this project.

1.4.4 Welding Procedure

Submit welding procedure statement showing the details of MIG welding procedure, materials used, current and voltage settings, gas mixture, and welding rate.

1.4.5 Installation Details

Provide shop drawings in accordance with manufacturer's installation drawings to include the following:

a. Overall dimensions

b. Controls

c. Typical front view

d. Typical cross sectional view

e. Typical side view

f. Typical assembly

g. Material

h. Connection of door frame to shield

i. Clearances

1.4.6 HEMP Shielded Door

Submit certification indicating HEMP shielded door being provided has been tested for compliance with MIL-STD-188-125-1. Submit test data supporting these certifications.

1.5 DELIVERY, STORAGE, AND HANDLING

Package HEMP shielded door for shipment. Ship HEMP shielded door assembled with the door frame to hold the door and frame in alignment. Include physical, temperature, and moisture protection, so that door is delivered to jobsite in an undamaged condition. HEMP shielded door will not be accepted at the jobsite with visible damage. Provide special physical, temperature, and moisture protection upon door arrival at jobsite; before, during, and after door installation through completion of building construction. Provide protection instructions from HEMP shielded door specialist (manufacturer) when special protection is required after installation but before building completion. Provide adequate protection prior to beneficial occupancy. Do not allow materials to be exposed to extreme temperature and humidity. Ship the door assembled with the door frame. Exercise great care when packing, shipping, unpacking and installing the HEMP shielded door and frame assembly.

1.6 COORDINATION

Avoid unauthorized penetrations. Repair work damaged as a result of unauthorized penetrations, discontinuities or other adverse changes to SA of the system.

1.7 WARRANTY

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NOTE: The warranty clause in this guide specification may require Level I Contracting Officer approval. Designer should consult the appropriate Engineering Field Division/Activity for guidance.

****

Warrant HEMP shielded door to provide the required SA, for a period of [15] [_____] years. Warrant parts and labor for operating mechanisms, including the interlocking components, for at least [3] [_____] years following the date of beneficial use. Any part of these mechanisms or component(s) causing operating or attenuation degradation of 5 dB or more during the warranty period must be repaired or replaced, including the required reinstallation and testing by the Contractor. HEMP shielded door assemblies must be suitable for repetitious use. Adequate structural strength and permanent sealing is required to meet the total specification, usage, and [15] [_____] year service life requirements. Assemblies including doors, hardware, shielding devices, sealing operating mechanisms, and other components must function properly through [10,000] [_____] cycles of use.

1.8 MAINTENANCE

1.8.1 Hardness Maintenance and Hardness Surveillance (HM/HS) Manual

Submit HEMP HM/HS manual. HM/HS are the combined routine and preventive maintenance, inspection, test, and repair activities performed on HEMP door to ensure that HEMP hardness is retained throughout system life cycle of HEMP shielded door installed under this contract. HEMP shielded door is a hardness critical item which must survive day to day use. Consult with Engineering Service Center, Code 065 before preparation of the HM/HS manual.

1.8.2 Spare Parts

Furnish one set of finger-stock and HEMP shielding gaskets (if door provided uses finger-stocks and gaskets) for each type, style, and size hinged HEMP shielded door provided under this contract. Furnish one set of manufacturer recommended and Contracting Officer approved spare parts for each HEMP shielded door of each style installed under this contract.

PART 2 PRODUCTS

2.1 HEMP SHIELDED DOOR AND FRAME

Steel conforming to ASTM A36/A36M or ASTM A1008/A1008M or ASTM A568/A568M or ASTM A1011/A1011M, and be stretcher leveled, and installed free of mill scale. Provide metals thicker where indicated or required. Provide metal thresholds of the type for proper shielding at the floor, rising not more than 6.35 mm 1/4 inch above finished flooring. Supply assemblies complete

with a rigid structural frame, hinges, latches, and all parts necessary for operation. Products supplied must duplicate assemblies that have been in satisfactory use for not less than [1] [_____] year. Provide door frame made of steel and suitable for welding to surrounding structure and shield. HEMP shielded door must be non-sagging, and non-warping. Provide HEMP shielded door with a minimum SA of 20 dB greater than minimum requirements per MIL-STD-188-125-1 when tested in the factory. Provide door with a clear opening of [915] [_____] mm wide and [2134] [_____] high [36] [_____] inches wide and [84] [_____] inches high. When the shielded door has knife edge and when it is exposed to moist air containing salt (near the sea coast), uncontrolled environment or corrosive environment; make knife edge out of stainless steel 430 (magnetic type) series. For security reason, locate controls and locking mechanism inside HEMP space so that unauthorized personnel cannot tamper.

2.1.1 Pneumatic Type Door

Form at door and door periphery a continuous conductive continuity seal by direct metal to metal contact. Implement continuity seal by exertion of force from the pneumatic pressure system that maintains adequate sealing pressure on entire face of the independently hung door panel, sealing each panel to the mating surfaces on the door frame. Construct door compartment in a manner such that each door panel forms an independent shield. Provide factory prepared mating surfaces of the door and frame to offer a corrosion-resistant, conductive, long-life finish. Finished area must form adequate peripheral margin on door panel and frame. Provide stand-alone, redundant compressed air system to support the HEMP shielded door. Provide emergency power to compressed air system. Design the system for fail-safe mode of operation.

2.1.1.1 Sealing System

Actuate pneumatic sealing system by a single, air control valve, operable from inside or outside. Include with outside control panel a pressure regulator and filter. Normal operation of the air control valve will unseal and allow manual operation of door within [15] [_____] seconds. Provide each door with a separate control-valve system.

2.1.2 Sliding Type Door

****
NOTE: Ensure door openings and operating direction are shown on the drawings.
****

Provide sliding HEMP shielded door of the size and operating direction indicated. Clear openings indicated must not require dismantling of any part of the door. Provide door manually operable from either side, inside or outside, with a maximum pull (force) of [156] [_____] Newton [35] [_____] pounds to set HEMP shielded door in motion. Construct HEMP shielded door face panels and frames from reinforced steel suitable for achieving the specified SA. Construct frame from steel welded together to form a true rectangular opening. In the sealed position, shielded door must provide minimum attenuation specified without any derating. Design door for long life and reliability and do not use RF gaskets, RF finger-stocks, or other sealing devices other than specified direct metal to metal contact. Provide label attached to sliding door warning against painting of the mating surfaces.

2.1.3 Electromagnetic Type Door (Swinging or Sliding)

Form HEMP seal by a solid metal to metal contact around the periphery of the door frame. Materials at the contact area must be compatible and corrosion resistant. Only electromagnets (permanent magnet unacceptable) may provide contact force. Provide minimum of two electromagnets. When the electromagnets are energized, door leaf will be magnetically attracted to ensure a solid and continuous contact with the door frame. When electromagnets are deenergized, the door leaf will be free to [swing] [slide]. The electromagnetic type HEMP shielded door must use exclusively electromagnets. Provide emergency power to the system. Design for fail-safe operation. The door manufacturer must provide HEMP filter(s) with surge arrestors, card access system, control panel, alarm panel, cipher or combination lock, any other hardwares if required and electrical penetration. Provide door with a minimum of three hinges.

2.1.4 Latching Type

Provide latching type HEMP shielded door with a three point minimum latching mechanism to provide proper compressive force for the radio frequency(RF) finger-stock. Operating handle must not mechanically interfere with the door frame when the HEMP shielded door is opened or closed. Force necessary to operate the lever (handle) to latch and release (unlatch) the HEMP shielded door must not exceed [98] [_____] Newton [22] [_____] pounds. Design HEMP shielded door handles fitted with lever openings so that a force of [1112.5] [_____] Newton [250] [_____] pounds may be applied at the free end in any direction without permanently deforming or damaging operating mechanism or degrading SA by 5 [_____] dB or more. Provide door latches and hinges rated for a minimum of [10,000] [_____] cycles without loss of SA and without adjustments.

2.1.4.1 Finger-Stock (Contact Finger)

Provide contacts of copper beryllium, phosphor bronze, or stainless steel finger-stock (contact finger) conforming to ASTM B194. Secure finger stock to the HEMP shielded door or frame without using special tools or adhesives and with a minimum of [50] [_____] mm [2] [_____] inches of overlap. Door RF seals must, after [10,000] [_____] cycles of opening and closing, continue to provide SA specified in MIL-STD-188-125-1 and sealing components will not need to be replaced.

2.1.5 Door and Frame Assembly

Provide each type of HEMP shielded door as an assembly with a frame welded into place in the primary shield. Accurately position door in frame.

2.2 HINGES

Provide each type of HEMP shielded door except the sliding type with a minimum of three well balanced, adjustable sealed ball bearing or adjustable radial, thrust-bearing hinges suitable for equal weight distribution of the HEMP shielded door. Hinges must allow adjustment in two directions. Comply with NFPA 101 for force necessary to set the HEMP shielded door in motion. Provide lubricating fitting at each hinge unless not required by the design of the hinge or the bearing.

2.3 HARDWARE AND ACCESSORIES

The door manufacturer must provide all hardware and accessories including

electrical filters if required.

2.3.1 Power Assist

Should HEMP shielded door mechanism preclude the manual operation of the HEMP shielded door with a specified maximum pull (force) of [156] [_____] Newton [35] [_____] pounds to set the HEMP shielded door in motion, provide a power assist system to meet the [156] [_____] Newton [35] [_____] pound requirement. Install power assist system in such a manner that the clear opening of the door is not obstructed. Provide redundant compressed air system. Provide emergency power to the control and redundant compressed air system.

Include the following:

a. Pressure regulator and air control valve to control the speed and direction of the door.

b. Provide pneumatic mechanism to power assist.

c. Air control valve operable from inside or outside.

d. Allowance for manual operation within [15] [_____] seconds should loss of air pressure occur.

2.3.2 Threshold Protectors

Provide threshold protectors for each of the HEMP shielded door consisting of portable ramps that protect the threshold when equipment carts or other wheeled vehicles are used to move articles across threshold. Ramps may be asymmetrical to account for different floor elevations on each side, but slope of ramp must not exceed 4:1 on either side. Design ramps to support a [227] [_____] kg [500] [_____] pound force applied to a 75 mm by 12.7 mm 3 inch by 1/2 inch footprint for cargo loading. Footprint contact area may be anywhere on the threshold seal area covered by threshold protector. Provide mounting brackets, convenient to the entry, to store ramp when not in use.

2.3.3 Locks and Interlocks

2.3.3.1 Cipher Locks

When specified by system design, provide cipher locks furnished by the door manufacturer to ensure compatibility of the electric bolt/strike and the controller. Provide cipher locks with the following features:

a. Exterior push button panel with a minimum of 10 numbered buttons (a combination of [4] [_____] of these buttons in proper sequence will activate the door opener).

b. Adjustable time penalty to block efforts to activate the door opener when incorrect or out-of-sequence button is pushed.

c. Adjustable door-open time control.

d. Ease in changing the combination.

e. Local alarm contact with manual reset to activate a bell if an incorrect or out-of-sequence button is pushed.

f. Latch bolt to be electrically operated on low voltage directly from the door control unit.

g. Adjustable volume bell to operate from the door control alarm unit.

h. Adjustable volume buzzer to be activated by a separate push button and a low voltage AC power source (with associated transformer and connection).

i. Provide emergency power or battery backup power to comply with Life Safety Code NFPA 101.

2.3.3.2 Interlocks

Provide interlocks for vestibule HEMP shielded door pairs. Design interlocks so that both doors cannot be opened at the same time during normal operation. Provide a manual override to allow emergency egress. Provide audible alarm, which continues to sound as long as both doors are open. Provide a low-voltage alarm in a tamper proof enclosure and with a sound intensity of [85] [_____] dB minimum at [3050] [_____] mm [10] [_____] feet. Provide lights on inside of HEMP space and on outside of exterior door to indicate that the other door is open. Integrate interlock system into the cipher lock system. Interlock system must be in a fail-safe unlocked condition in the event of power failure. Ensure activation of fire alarm overrides the interlock system. Provide emergency power to interlock control.

2.3.4 Threshold Alarm

Provide press-it-any-point ribbon switches for use with threshold to enunciate alarm when pressure is applied to the threshold of HEMP shielded door.

2.3.5 Hold Open Device

Provide each HEMP shielded door leaf with a hold open device permanently attached to the door leaf.

2.3.6 Counting Device

Provide electric or electronic device for counting open, close cycles of HEMP shielded door.

2.3.7 Door Stop

Provide door stop to prevent HEMP shielded door from hitting the wall.

2.4 EMERGENCY EXIT HEMP SHIELDED DOOR

Equip emergency exit HEMP shielded door with panic hardware. The force required to latch and unlatch the emergency exit HEMP shielded door must meet Life Safety Code NFPA 101. Alterations or modifications in the field to panic hardware are prohibited.

2.5 PAINTING

Paint HEMP shielded door in accordance with Section 09 90 00 PAINTS AND COATINGS with an environmentally acceptable, OSHA approved rust inhibiting

primer that will provide corrosion resistance. HEMP shielded door may be factory finish painted; provided damaged paint is touched-up. Do not paint stainless steel surfaces and grounding contacts.

2.6 TOOLS

Furnish one full set of special tools that are required to maintain each type of door provided under this contract and that are not typically available from tool vendors. Furnish environmentally safe lubricants, cleaning solvents or coatings which meet OSHA regulations in sufficient quantities to last for [3] [_____] years.

2.7 ELECTRIC CONNECTIVITY

Install sensors, alarms, interlocks and filters in accordance with HEMP shielded door manufacturer's instructions.

2.8 MAINTENANCE SUPPLIES AND PROCEDURES

Deliver for each door maintenance supplies sufficient for a [3] [_____] year period or [50,000] [_____] cycles, whichever is greater. Include the activity and entry location for certifying that the maintenance was undertaken. Provide a counting device to show the number of door open close cycles. Prominently display maintenance instructions required to maintain the door through the cycle count. Maintenance procedures must be such that the HEMP SA meets the requirements of MIL-STD-188-125-1.

2.9 SOURCE QUALITY CONTROL

Test of HEMP shielded door at factory will require shielded room. Factory test of HEMP shielded door must comply with requirements of this specification and MIL-STD-188-125-1. Government reserves the right to witness all factory tests. Provide [30] [_____] days notice for test performed in Continental United States and [45] [_____] days for overseas locations. Conduct the swinging door static load test, swinging door sag test, door closure test, and handle pull test on each door of each size and each type provided including electromagnetic type. Use the HEMP filter(s) with surge arrestors, card access system, control panel, alarm panel, cipher or combination lock(s), and any other hardwares to ensure the entire system meets the specification requirements. Submit a Test Plan for the test specified herein.

2.9.1 Swinging Door Static Load Test

Mount and latch swinging HEMP shielded door to its frame and then set down in a horizontal position so that the door opens downward and only the frame is rigidly and continuously supported from the bottom. With door closed, apply a load of [195] [_____] kg/m2 [40] [_____] pound per square foot uniformly over the entire surface of the door for at least [30] [_____] minute. Door will not be acceptable when this test causes breakage, failure, or permanent deformation that results in the clearance between door leaf and stops to vary more than 1.58 mm 1/16 inch, or reduction of SA by 5 dB. Perform this test on all door types, including electromagnet type. Subject the same door leaf to the door closure, handle pull and door sag tests.

2.9.2 Swinging Door Sag Test

Install HEMP shielded door and its frame normally and open 90 degrees.

Suspend two [45.4] [_____] kg [100] [_____] pounds weights from door, one on each side of door, within [125] [_____] mm [5] [_____] inches of the outer edge for at least [30] [_____] minutes. Door will not be acceptable when this test causes any breakage, failure, or permanent deformation that results in the clearance between door leaf and door frame to vary more than 1.58 mm 1/16 inch from its original dimension, or reduction of SA by 5 dB. Perform this test on all door types, including electromagnet type.

2.9.3 Door Closure Test

Operate HEMP shielded door of each size, type, design [10,000] [_____] complete open-close cycles. HEMP shielded door will not be acceptable when this test causes any breakage, failure, or permanent damage or deformation that results in clearance between door and frame to vary more than 1.58 mm 1/16 inch from its original dimension, or reduction of SA by 5 dB. Perform this test on all door types, including electromagnet type.

2.9.4 Handle Pull Test

Mount and latch HEMP shielded door to its original frame. Apply a force of [1112.5] [_____] Newton [250] [_____] pound perpendicular (outward) to handle within [50] [_____] mm [2] [_____] inch of the end for at least [30] [_____] minutes. Door will not be acceptable when this test causes any breakage, failure, or permanent damage or deformation exceeding 3.17 mm 1/8 inch from its original dimension, or reduction of SA by 5 dB. Perform this test on all door types, including electromagnet type.

2.9.5 Electromagnetic SA Test

Perform this test on each size, and type shielded door after performing the following test: swinging door static load, swinging door sag, door closure and handle pull tests. Door will not be acceptable when this test causes in the reduction of SA by 5 dB. Test HEMP shielded door for SA in the factory or independent lab prior to shipping to jobsite. HEMP shielded door must comply with minimum requirements of MIL-STD-188-125-1. Make measurements for SA at [6] [_____] number of test points required by MIL-STD-188-125-1 for HEMP single leaf personnel shielded door, [9] [_____] test points for HEMP double leaf shielded door, and all penetrations of door. Scale up number of test points proportionately for larger doors. Locate test points around periphery of door and at center of astragal. Perform testing in accordance with MIL-STD-188-125-1 and modified (orient magnetic loop antenna co-axial or co-planar or cross which ever gives least SA or maximum signal pick-up) IEEE 299. Required SA will be 20 dB above minimum of MIL-STD-188-125-1 at each test frequency for each test point. Repair is allowed, however, modification is prohibited.

2.9.5.1 Test Frequencies (Factory Test)

Make magnetic field, electric field, and plane wave measurements at the following seven test frequencies.

a. Magnetic field (low impedance): One frequency at 14 KHz, one frequency at 100 KHz, one frequency at 1 MHz, and one frequency at 10 MHz.

b. Electric field (high impedance): One frequency at 30 MHz.

c. Plane wave (377 ohm): One frequency at 100 MHz, one frequency at 400

MHz, one frequency at 750 MHz, and one frequency at 1 GHz.

2.9.5.2 Test Methodology

Regardless of test methodology or procedure used, orient antenna for maximum signal pickup or least SA. Orient magnetic loop antennas for co-axial, co-planar, or cross for maximum signal pick up or least SA. Orient horn antenna vertically or horizontally for maximum signal pick up or least SA.

2.9.5.3 Test Instruments and Equipment

a. Use instruments and equipment with current, non-expired calibration tags. Traceable to the National Institute of Standards and Technology (NIST).

b. Use spectrum analyzer of direct reading, digital type. Use slow sweep, and sweep at least three times prior to taking measurements.

c. Use signal generator frequency synthesized.

d. Provide a dynamic range a minimum of 10 dB above the SA requirement.

2.9.5.4 Calibration and Recalibration

Calibrate test set up and signal each time power is turned off or set up is moved. During test, Government representative or Government witness reserves the right to verify the test signal. Calibrate prior to each test, and at the end of each test. Use only the equipments, cables, antennas, amplifiers, attenuators used for calibration of transmitters and receivers respectively for testing. At the end of each day, recalibrate if the dynamic range varies more than 3 dB compared to the beginning of the calibration of each day. Retest all test points.

2.9.5.5 Inspection

In-plant quality control procedures will be required to ensure that HEMP shielded door provides required SA. Include:

a. Measurement of all dimensions and spacings. Hold dimensions on approved shop drawings to within allowable tolerances.

b. Inspection of material, construction methods, and finishes.

2.9.5.6 Independent Tester

Furnish testing by an independent tester who is regularly engaged in performing SA tests conforming to the procedures contained in IEEE 299 and MIL-STD-188-125-1. Independent tester must not offer advice or suggestions to correct problem. Only HEMP shielded door manufacturer may offer suggestions or advice to correct problems. General Contractor will hire the independent tester.

2.9.6 ELECTROMAGNET (EM) SHIELDED DOOR TESTS

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NOTE: The following tests are required for EM shielded door only.

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2.9.6.1 EM R.F. Seal Breaking Force

Mount the shielded door in a horizontal position with the door capable of opening downward and support the door frame rigidly. Energize the EM coils. Load one corner of the shielded door, apply weights sin an area not to exceed 0.2075 square meter 324 square inches, opposite to hinged corner (not supported by hinges) by weights. With the EM coils energized, the force required to break EM R.F. seal must be not less than 2003 N 450 pounds. Subject the same door leaf of each size to SA due to residual magnetism, and SA due to inner and outer coil tests.

2.9.6.2 SA Due to Residual Magnetism (RM)

Perform in-factory tests for all test points to determine the SA due to residual RM by disconnecting the power by unplugging/deenergizing the power source, vice activating "Open Door Switch." Activating "Open Door Switch" will reverse the polarity of EM resulting in reduced RM, hence, reduces the force required to open the shielded door. Perform this test in the factory in the installed position. The SA for each test point and for each frequency, must not be less than 50 percent to minimum required.

2.9.6.3 SA Due to Inner or Outer or Both EM Coils

Perform this in-factory test by energizing one at a time inner, outer, and both EM coils to determine the SA provided by inner, outer , and both EM coils. Perform this test in the factory for each test point and for each frequency. The SA for each test point due to inner or outer coil must not be less than 80 percent of minimum required.

PART 3 EXECUTION

HEMP shielded door manufacturer must furnish supervision and installation of work performed under this section.

3.1 HEMP SHIELDED DOOR FRAME AND ASSEMBLIES

Weld door frame to HEMP shield using Metal Inert Gas (MIG) method. Install HEMP shielded door under direct supervision of HEMP shielded door specialist and per manufacturer's recommendations. Adopt skip welding technique to minimize warpage.

3.2 HEMP DOOR FRAME ACCESSIBILITY

Entire periphery including threshold of HEMP shielded door frame where attached to HEMP shield must be accessible from inside and outside of shield for access and future removal with minimum demolition.

3.3 HEMP SHIELDED DOOR INSTALLATION

HEMP shielded door manufacturer must install the frame and shielded door(s). Install HEMP shielded door assemblies as complete assemblies in pre-existing prepared openings. Install in accordance with the approved shop drawings, and peripherally MIG weld HEMP shielded door to HEMP shield. Exercise care during installation to prevent damage, especially to finger-stock (contact fingers) and or RF gaskets. Furnish doors, frames, thresholds, and associated hardware as preassembled matched units. Install each unit in its respective door openings in accordance with the approved shop drawings. Maintain alignment within tolerances as

shown in the approved shop drawings during installation and tack welding and final welding of the HEMP shielded door assembly to preclude warpage.

3.4 POST INSTALLATION PROTECTION

During construction phase, keep opening and closing of HEMP shielded door to a minimum, in order to limit wear on door components, particularly contact surfaces. Plan operations to keep HEMP shielded door in a permanently open position, with protection over the sensitive components, during construction activities. Secure temporary covers of not less than 15.87 mm 5/8 inch thick plywood to protect exposed RF contacts from physical damage. Apply easily removable masking or strippable coatings over contact surfaces to eliminate soiling and corrosion. Remove coatings, clean contact surfaces with an appropriate environmentally safe and OSHA approved solvent prior to final acceptance testing. Place threshold protective ramps over threshold when doors are blocked open. Replace components that have been damaged during construction phase.

3.5 FIELD QUALITY CONTROL

3.5.1 Tests

Shielded door manufacturer will supervise and install HEMP shielded door to ensure that HEMP shielded door and frame is installed without misalignment or warpage that would degrade the performance of the HEMP shielded door. The HEMP shielded door specialist must be present to witness field tests including retests to correct problems. Perform the following tests on-site after HEMP shielded door is installed in completed HEMP shield. Prior to performing repair, Contracting Officer will approve corrective, recommended, or adopted measures.

3.5.1.1 Final Acceptance Test

Government reserves the right to witness and field testing. Provide [30] [_____] days advance notice for field testing within Continental United States. A [45] [_____] day notice is required for testing conducted outside Continental United States. Engineering Service Center, Code 065, will witness all tests and repair on the shielded door. Make acceptance testing of HEMP shielded door at construction site as part of acceptance test of HEMP protection system. HEMP shielded door manufacturer can perform corrections and repairs necessary to bring HEMP shielded door into compliance with MIL-STD-188-125-1, however, modification is prohibited.

a. EM SA test: HEMP shielded door must comply with the minimum requirements of MIL-STD-188-125-1. Make measurements for SA at [6] [_____] test points required by MIL-STD-188-125-1 for single leaf personnel HEMP shielded door, [9] [_____] test points for double leaf HEMP shielded door, and all penetrations of shielded door. Scale up number of test points proportionately for larger HEMP shielded door. Locate test points around periphery of HEMP shielded door and at center of astragal. Perform testing in accordance with MIL-STD-188-125-1 and modified (orient magnetic loop antenna co-axial or co-planar or cross whichever gives least SA or maximum signal pick-up) IEEE 299.

b. Test frequencies: Make magnetic field, electric field, and plane wave measurements at the following seven test frequencies.

(1) Magnetic field (low impedance): One frequency at 14 KHz, one

frequency at 100 KHz, one frequency at 1 MHz, and one frequency at 20 MHz.

(2) Electric field (high impedance): One frequency at 30 MHz.

(3) Plane wave (377 Ohm): One frequency at 100 KHz, one frequency at 400 MHz, one frequency at 750 MHz, and one frequency at 1 GHz.

Sweep each test point 610 mm 2 feet around test point.

c. Test methodology: Regardless of test methodology or procedure used, orient antennas for maximum signal pickup or least SA. Orient magnetic loop antennas for co-axial, co-planar, or cross for maximum signal pick up or least SA. Orient horn antenna vertically or horizontally for maximum signal pick up or least SA.

d. Test instruments and equipment:

(1) Instruments and equipment: Current, non-expired calibration tags traceable to NIST.

(2) Spectrum analyzer: Direct reading and digital. Use slow sweep, and sweep at least three times prior to taking measurements.

(3) Signal generator: Frequency synthesized.

(4) Dynamic range: Minimum of 10 dB above SA requirement of MIL-STD-188-125-1.

e. Independent tester: SA tests will be performed by an independent tester regularly engaged in SA testing and tests must conform to the procedures contained in modified(orient magnetic loop antenna co-axial or co-planar or cross whichever gives least SA or maximum signal pick-up) IEEE 299 and MIL-STD-188-125-1. Independent tester must not offer advice or suggestions to correct problem. General Contractor will hire the independent tester.

f. Calibration: Calibrate test set up and signal each time power is turned off or set up is moved. During test, Government representative or Government witness reserves the right to verify the test signal. Calibrate prior to each test, and at the end of each test. Use only the equipments, cables, antennas, amplifiers, attenuators used for calibration of transmitters and receivers respectively for testing.

g. Interlock alarm configuration tests (field): Test electrical and functional operation of interlock alarm system[, including cipher locks (when included),] to verify performance of interlock system.

h. Force tests (field): Perform test for force required to latch and release (unlatch) each HEMP shielded door in installed position (field) in the presence of the Contracting Officer or the Contracting Officer's representative. Perform test by using a calibrated force measuring device, recording and retaining maximum force required to latch and release (unlatch) until reset. Modifications or alterations to panic hardware of emergency exit HEMP shielded door to meet NFPA 101 force requirements for latching and releasing (unlatching) are prohibited.

i. Recalibration: At the end of each day, recalibrate if the dynamic

range varies more than 3 dB compared to the beginning of the calibration of each day. Retest all test points.

3.5.2 EM Shielded Door Tests

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NOTE: The following test are required for EM shielded door only.
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3.5.2.1 SA Due to RM

Perform tests for all test points to determine the SA due to residual RM by disconnecting the power by unplugging/deenergizing the power source, vice activating "Open Door Switch." Activating "Open Door Switch" will reverse the polarity of EM resulting in reduced RM, hence, reduces the force required to open the shielded door. Perform this test in the field in the installed position. The SA must be not less than 50 percent of minimum required.

3.5.2.2 SA Due to Inner or Outer or Both EM Coils

Perform this test by energizing one at a time inner, outer, and both EM coils to determine the SA provided by inner, outer, and both EM coils. Perform this test in the field in the installed position. The SA for each test point, due to inner or outer coil, must be not less than 80 percent of minimum required.

3.6 TRAINING

Provide a minimum of [8] [_____] hours of hands on maintenance training to each person designated by the Contracting Officer. Training must include but not be limited to routine, preventive and corrective maintenance, cleaning of knife edge, finger-stock, alignment of doors, adjustment of latching mechanism, replacement of gaskets and finger-stocks, lubrication, interlock, locking (latching) mechanism, and adjustment of hinges. Provide [6] [_____] [VHS] [_____] video cassette tapes showing details and procedures of hardness critical item HEMP shielded door in accordance with HM/HS manual.

3.7 SITE SPECIFIC REPAIRS AND TEMPORARY FIXES

Corrections and repairs are allowed, however, modification is prohibited. Use of bronze wool, conductive tape, conductive caulking, pieces of RF gaskets all shapes and sizes, rope gasket, and microwave absorber, which are normal troubleshooting aids are prohibited as permanent solution (fix) to correct design or manufacturing deficiencies of HEMP shielded door. Only the use of materials such as RF gasket, finger-stock shown in approved shop drawings, catalog, HM/HS manual, and list of material will be acceptable. Each HEMP shielded door of similar design must contain identical RF gasket material.

3.8 RETESTS

Retest each repair, adjustment, corrective action including cleaning or HEMP shielded door at each frequency for each test point. If retest is scheduled for a later date, provide [30] [_____] days notice for Continental United States and [45] [_____] days notice for overseas locations for Government to witness the retests. Recalibrate if the

dynamic range varies more than 3 dB compared to the beginning of the calibration of each day. Retest each test points. Recalibrate if any hardware is changed.

3.9 EMERGENCY EXIT PANIC HARDWARE FIELD MODIFICATION

Equip emergency exit with panic hardware. Force required to release (unlatch) emergency exit HEMP shielded door must meet NFPA 101. Modifications or alterations to panic hardware and latching mechanism in the field is prohibited in order to meet NFPA 101.

3.10 WELDING

AWS D1.1/D1.1M, certified welders. When specimens are removed from part of an assembly, repair cut members at no additional cost to Government, with joints of proper type to maintain SA and to develop full strength of members and joints cut, with peelings as necessary or directed to relieve residual stress. Provide welder identification next to weld.

-- End of Section --