

**134923 - RADIO FREQUENCY SHIELDED ENCLOSURE ASSEMBLY (60dB AL5 5 MIL ALUMINUM FOIL)**

**PART 1 - GENERAL**

**1.1 SUMMARY**

- A. Extent and type of RF shielded rooms are indicated on Drawings and by provisions of this Section.
- B. Work included in this Section:
  - 1. RF Shielding performance requirements
  - 2. RF Shielding materials.
- C. Related Sections: The following Sections contain requirements that relate to this Section:
  - 1. Division 08 for Doors.
  - 2. Division 21 for Sprinkler Systems.
  - 3. Division 23 for HVAC.
  - 4. Division 26 for connection of equipment to building electrical service.

**1.2 QUALITY ASSURANCE**

- A. Fire Rating: Aluminum foil shall meet ASTM E84 Class A standards.
- B. Sprinkler Systems shall comply with the requirements of NFPA 13.
- C. Ventilation Systems: Comply with the requirements of the local and States Building Code with respect to minimum ventilation requirements.
- D. Electrical Equipment and Wiring:
  - 1. Comply with requirements of the "National Electrical Code" of the National Fire Protection Association (NFPA).
  - 2. Provide electrical components, including, but not limited to lighting, and receptacles section listed and labeled by Underwriter's Laboratories, Inc. (UL) for electrical safety.
  - 3. Provide electrical panels listed and labeled by UL, ETL, MET, or CSA.
- E. Buy American Act Compliant (if required): Made in the USA
- F. BOD: Basis Of Design

### 1.3 SUBMITTALS

- A. Product Data: Submit Manufacturer's literature indicating compliance with requirements, and the following:
  - 1. Installation instructions.
  - 2. Operating and maintenance instructions for each material.
- B. Shop Drawings: Showing construction of enclosure, including component data sheets, control diagrams, and operating sequence information. All shop drawings should be project specific with field verified dimensions.
  - 1. Provide details including but not limited to:
    - a. Material joints/seaming
    - b. Material transitions
    - c. Corners
    - d. Floor to wall transition
    - e. Wall to ceiling transition
    - f. Door frame and threshold
    - g. Penetrations
    - h. Waveguide pass-thrus
    - i. EMI power filters
- C. Product Warranties: Submit manufacturer's standard written warranty for each RF shielded room covering, at minimum, one year, parts and labor.

## PART 2 - PRODUCTS

### 2.1 RADIO FREQUENCY SHIELDING PERFORMANCE MINIMUM REQUIREMENTS (60dB):

|    |                           |       |
|----|---------------------------|-------|
| 1. | 10 KHz, Magnetic Field    | 25 dB |
| 2. | 100 KHz, Magnetic Field   | 45 dB |
| 3. | 200 KHz, Magnetic Field   | 50 dB |
| 4. | 200 KHz, Electrical Field | 60 dB |
| 5. | 1 MHz, Electrical Field   | 60 dB |
| 6. | 10 MHz, Electrical Field  | 60 dB |
| 7. | 400 MHz, Plane Wave       | 60 dB |
| 8. | 1 GHz Plane Wave          | 60 dB |
| 9. | 10 GHz Plane Wave         | 60 dB |

### 2.2 ACCEPTABLE MANUFACTURERS

- A. Manufacturer: Subject to compliance with requirements, provide products of one of the following:
  - 1. RA Mayes Company, Inc.
  - 2. US Foils, Inc.
  - 3. Xalon RF Shielding Systems.
  - 4. SRG Shielding Resources Group, Inc.
  - 5. Universal Shielding Corp.
  - 6. Ramsey Electronics.

### 2.3 RADIO FREQUENCY SHIELDED ENCLOSURE ASSEMBLY

- A. Walls & Ceiling: Provide min 5 mil solid aluminum foil between 5/8" plywood / sheetrock and 5/8" sheetrock.
- B. Floors: Provide min 5 mil solid aluminum foil between (2) layers of Class A fire rated plywood, 1/4" thick bottom layer with 3/4" top

layer with finish floor covering on top. Alternate apply 20 mil aluminum 4'x 8' panels adhesive attached to waterproof sealed/primed concrete floor. Second alternative apply 26 gauge galvanized steel 4' x 8' panels adhesive attached to the concrete floor.

- C. Floor Covering: Per finish schedule.
- D. Perimeter corners: Cover all perimeter corners, wall to wall, wall to floor, and wall to ceiling, with 6" wide foil tape or galvanized steel (minimum 26 gauge) L-shaped (minimum 4" x 4") flashing.
- E. 3-way Corners: Provide prefabricated galvanized steel (minimum 26 gauge) corner flashing at all 3-way corners or folded 5 mil aluminum foil.
- F. Doors: Provide units with the following characteristics:
  - 1. Size: As required
  - 2. Threshold: The door is supplied with a steel or stainless-steel threshold for both the "flush sill" And "raised sill" configuration. The threshold is electro-mechanically attached to the door frame assembly. The threshold is available in single or dual tapers (for new or existing construction). The sill has a maximum height of ½" (after installation of customer supplied flooring).
  - 3. Door finish: The standard door face finish is primed gray. As an option, the faces of the door can be supplied with a wood veneer or a high-pressure plastic laminate (HPPL) which is "Natural Oak" in color. (Other colors and or finishes are available on request)
  - 4. Acoustics (if required): STC-45 (optional STC-50 or STC-52), with acoustical seal package
  - 5. Door closers (if required): By door manufacturer.
  - 6. Hardware: The door is supplied with all hardware in a US26D finish and Clear Anodized (which is Satin Chrome). The hinge mechanism is a commercial grade, full surface, security hinge. The hinge system is designed and installed so there is no contact between the RF seals and the hinge plates. The standard lockset provided is a "passage" extra heavy duty lever handle which meets the Accessibility Guidelines of the Americans with Disabilities ACT (ADA), the Uniform Federal Accessibility Standards and ANSI 156.2, Series 4000, Grade 1. (optional hardware: Lockmasters LKM10K with Kaba Mas X-10 Security Locks and Hardware, manual or electric)
  - 7. Operating Force: The door is designed to be opened or closed with less than 20 pounds of push or pull pressure.
  - 8. Warranty: The door is furnished will have a standard two (2) year limited warranty.

#### **2.4 5 MIL RF SHIELDING ALUMINUM FOIL**

- A. General:
  - 1. Aluminum RF Shielding Foil is designed to block analogue and pulsed digital signals from exterior sources such as RF, Microwave Transmitters, Cell Phone Towers, neighbors Cordless Telephones, Wi-Fi signals, Smart Meters and more. The foil also offers an effective barrier against Low Frequency AC Electric Fields when grounded.
- B. Description:
  - 1. Minimum 5 mil thick solid aluminum RF shielding foil
    - a. 24" or 48" wide rolls (typically 150' long)
    - b. 4' x 8' RF shielded floor panels

2. Tape all seams with 4" wide, 5 mil thick with 2 mil thick (7 mil total thickness) aluminum foil tape with electrically conductive pressure sensitive adhesive.
- C. BOD: US Foils for EMI-SHIELD AL5 Shielding Foil, electrically conductive foil tape and EMI-SHIELD AL20 panels. Xalon RF Shielding Systems for galvanized steel floor panels and corner flashing.

## **2.5 DOORS**

1. BOD: Xalon RF Shielding Systems or Shielding Resources Group.
  - a. SRG Shielding Resources Group, Inc.
    - 1) ULTRA-RF/A standard 60dB door with 50 STC rating. (optional STC-52 rating)
    - 2) ULTRA-RF standard 60dB door with no STC requirement.
    - 3) XPSS RF shielded 60dB door with STC (45-52) rating.
2. Threshold
  - a. Flat or slightly raised and ADA compliant (if required).

## **2.6 HEATING VENTILATION AND AIR CONDITIONING**

- A. Vent Type: Inline air vent, waveguide below cutoff frequency type, 3/16" x 1" thick hex cell, lead free steel or brass honeycomb.
- B. Design RF shielded air vents: Install inline waveguide to provide proper airflow as designed, and to maintain a shielding effectiveness equal to that of shielded enclosure.
- C. BOD: Universal Shielding Corp. and Shielding Resources Group.

## **2.7 FIRE PROTECTION SYSTEMS**

- A. Connect dielectric union between metal fire sprinkler pipe and waveguide piping outside of the RF shield wall or ceiling. All piping within the RF shield shall be galvanized steel, brass, hard temper copper or black steel pipe in accordance with NFPA 13.

## **2.8 ELECTRICAL SYSTEMS AND ACCESSORIES**

- A. General: Refer to Division 26 for all associated electrical systems and accessories
- B. Provide metal wall stud grounding.
- C. Provide EMI power line filters for all AC and DC.
- D. Provide EMI data line filters for Ethernet, HVAC control, security and fire alarm and detection.
- E. BOD: Universal Shielding Corp. for power filters and Ramsey Electronics for ethernet and security filters.

## **2.9 LIGHTING**

- A. RF Shielded hard cap ceiling: Provide surface mounted lighting (incandescent or LED preferred)
- B. RF Shielded suspended ceiling: Ceiling grid mounted AC or DC LED lighting on finish drop ceiling (remote drivers located outside of

shielded enclosure, for DC).

- a. BOD: Xalon RF shielding Systems X8000T RF shielded ceiling panels.
- C. Unshielded suspended ceiling: standard troffer lighting.

## **2.10 WAVEGUIDE PIPE PASS-THRU FOR FIBER-OPTIC LINES**

- A. BOD: Universal Shielding Corp or SRG Shielding Resources Group, Inc.
  - 1. RF Shielded Threaded Pipe Penetration
- B. Provide 1" diameter RF Tubular waveguides
  - 1. Performance requirements to maintain integrity of the shielded enclosure.
  - 2. Refer to plans for locations.

## **PART 3 - EXECUTION**

### **3.1 INSTALLATION**

- A. Field assemble shielded enclosure components following manufacturer's printed instructions.
- B. Wall and Ceiling:
  - 1. Verify all RF secure room perimeter metal wall and ceiling studs are tied to earth ground.
  - 2. Install the first layer of 5/8" sheetrock and 5/8" class A, plywood around all openings and penetrations
  - 3. Install the galvanized steel flashing on all corners, wall to wall, wall to floor and wall to ceiling.
  - 4. 5 mil aluminum RF foil sandwiched between 1 layer of 5/8" class A fire rated plywood and 1 layer of 5/8" sheetrock at walls and ceiling. Sandwiched between 2 layers of class A fire rated plywood at floor.
  - 5. Roll onto desired surface and adhere with RF shielding foil manufacturer approved adhesive.
  - 6. Butt joint or overlap sections by 2" min. to ensure there are no gaps for best protection.
  - 7. Tape the joints with 5 mil aluminum foil tape with electrically conductive PSA.
  - 8. Provide continuous coverage on all sides of enclosure.
    - a. Treat any penetrations with appropriate shielding components to maintain the integrity of the shielded enclosure. Penetrations include:
      - 1) Doors
      - 2) HVAC air vents and controllers
      - 3) Electrical, Communication Lines, Security Lines
      - 5) Fire sprinkler and controllers
      - 6) Waveguide pass-thrus
      - 7) Windows
  - 9. Ground material per manufacturers specification.
- C. Doors:

1. Install doors in accordance with manufacturer's details and instructions and sequencing.
- D. Provide all required cutting and patching of openings required for mechanical and electrical penetrations of room.
- E. Field plumb and wire the various system components that cannot be factory plumbed and wired. Comply with referenced building codes and requirements of authorities having jurisdiction.

### **3.2 FIELD TESTING**

- A. Test enclosure in accordance with MIL-STD-285 or IEEE-299 (2006), as modified for RF system installation. Demonstrate the required attenuation as detailed under Performance paragraph.
- B. Qualification Testing: Perform immediately prior to and after completion of the enclosure and prior to installation of architectural surfaces within or outside the enclosure. Make no trade connections to enclosure until successful completion of test process.
  1. Testing will be witnessed by a representative of Owner, or other designated person.
  2. Furnish a written test report to Owner and or Architect.
- C. Acceptance Testing: Perform immediately after installation of architectural surfaces within and outside the enclosure.
  1. Testing will be witnessed by at a representative of Owner, or other designated person.
  2. Furnish a written test report to Owner and Architect.

+ + END OF SECTION + +