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Preparing Activity: USACE Superseding
UFGS-09 69 00 (April 2006)
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UNIFIED FACILITIES GUIDE SPECIFICATIONS

References are in agreement with UMRL dated January 2008

SECTION TABLE OF CONTENTS

DIVISION 09 - FINISHES

SECTION 09 69 19

STRINGERLESS ACCESS FLOORING

04/07

PART 1 GENERAL

- 1.1 REFERENCES
- 1.2 SUBMITTALS
- 1.3 SYSTEM DESCRIPTION
 - 1.3.1 Allowable Tolerances
 - 1.3.2 Floor Panels
 - 1.3.3 Pedestals
 - 1.3.4 Bonding Strength of Pedestal Adhesive
 - 1.3.5 Bond Strength of Factory Installed Covering
 - 1.3.6 Seismic Calculations
 - 1.3.6.1 Navy Requirements
 - 1.3.6.2 Army Requirements
 - 1.3.7 Air Leakage
 - 1.3.8 Grounding
 - 1.3.8.1 Metal Grilles
 - 1.3.8.2 Joint Resistance
- 1.4 DELIVERY, STORAGE, AND HANDLING
 - 1.4.1 Delivery
 - 1.4.2 Storage
 - 1.4.3 Handling
- 1.5 EXTRA MATERIALS
- 1.6 DETAILED INSTALLATION DRAWINGS

PART 2 PRODUCTS

- 2.1 FLOOR PANELS
 - 2.1.1 Floor System Drawings And Planer Quality
 - 2.1.2 Panel Construction
 - 2.1.2.1 Aluminum
 - 2.1.2.2 Hollow Formed Steel
 - 2.1.2.3 Metal-Clad Cementitious Fill (Composite Panels)
 - 2.1.2.4 Metal-Clad Wood Core
 - 2.1.2.5 Lightweight Concrete Panels
 - 2.1.3 Floor Covering

2.1.3.1	High Pressure Laminate
2.1.3.2	Conductive Surfacing
2.1.3.3	Conductive High Pressure Laminate
2.1.3.4	Vinyl Composition Tile
2.1.3.5	Carpet
2.1.4	Edge Strip
2.1.5	Accessories
2.1.6	Resilient Base
2.1.7	Lifting Device
2.2	PANEL SUPPORT SYSTEM
2.3	FASCIA
2.4	STEPS AND RAMPS
2.4.1	Steps
2.4.2	Ramps
2.5	RAILINGS
2.6	FACTORY TESTS
2.6.1	Load Tests
2.6.2	Bond Strength of Covering
2.7	COLOR
2.8	REGISTERS AND GRILLES
2.9	PERFORATED AIR SUPPLY PANELS
2.10	CUT OUTS
2.11	EDGE CLOSURE
PART 3	EXECUTION
3.1	INSTALLATION
3.1.1	Preparation for Installation
3.1.2	Pedestals
3.1.3	Auxiliary Framing
3.1.4	Panels
3.1.5	Resilient Base
3.1.6	Fascia Plates
3.1.7	Repair of Zinc Coating
3.2	FIELD TESTS
3.2.1	Acceptance Tests
3.2.2	Electrical Resistance
3.3	CLEANING AND PROTECTION
3.3.1	Cleaning
3.3.2	Protection
3.3.3	Surplus Material Removal
3.4	FIRE SAFETY
3.5	SEISMIC SPECIAL INSPECTION AND TESTING
3.6	OPERATION AND MAINTENANCE MANUALS
-- End of Section Table of Contents --	

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SECTION 09 69 19

STRINGERLESS ACCESS FLOORING 04/07

NOTE: This Guide Specification covers the requirements for stringerless access flooring.

Edit this guide specification for each project specific requirements by adding, deleting, or revising text. Choose applicable bracketed items(s) or insert appropriate information.

Remove information and/or requirements not related to the respective project, whether or not brackets are present.

Comments and suggestions on this guide specification are welcome and should be directed to the technical proponent of the specification. A listing of technical proponents, including their organization designation and telephone number, is on the Internet.

Recommended changes to a UFGS should be submitted as a Criteria Change Request (CCR)

Brackets are used in the text to indicate designer choices or locations where text must be supplied by the designer.

PART 1 GENERAL

NOTE: This specification does not include the floor upon which the elevated floor is superimposed, except to define the nature and condition of the supporting floor.

Access flooring systems include floor panels, pedestals and items such as steps, ramps, closures and trim. Access flooring systems must be designed to accommodate static, rolling and impact loading.

None of the mechanical and electrical services essential to the operation of equipment are included. Coordinate with mechanical and electrical to provide ventilation and cable openings which will be required.

The designer is responsible for identifying and defining requirements for the floors. Drawings must indicate location and limits of the flooring systems, finish floor elevation, panel size, type, finish and anti-static provisions, colors, pedestal mounting and subfloor connection system details.

RIGID GRID ACCESS FLOORING is covered in SECTION 09 69 13.

Stair and/or ramp information, such as tread width and riser height for stairs and width, slope and length of ramps, including railings, are included in this section.

Ancillary components such as floor diffusers and grills, fascias and floor opening trims are also included.

Seismic loadings and any other information required to indicate the extent of work must be considered in designing access flooring systems.

There are three fundamental conditions relative to the design of access flooring installations:

Condition I floors are completely surrounded by building walls. These are the most resistant to seismic loadings.

Condition II floors have part of the edge exposed and not restrained by other structural elements. Condition II floors are less resistive to seismic loadings along the axis of the unconstrained side. Seismic loadings can be resisted by securing the perimeter panels of all floors to the supporting structural framing and fitting the panels tightly together, or by cross bracing the structural frame to resist overturning. The designer must select fascia type and finish for exposed edges.

Condition III floors are free standing without lateral contact with other structural elements. Type III floors are primarily strengthened with cross bracing to resist lateral loads.

Buildings not excluded by UFC 3-310-02A or TI 800-01 Design Criteria will be accessible in accordance with 36 CFR, Part 1191, Americans with Disabilities Act (ADA) Accessibility Guidelines for Buildings and Facilities.

On the drawings, show:

1. Extent and shape of access flooring area. Include details of panel-to-panel and panel-to-wall intersections, edge treatment at openings, expansion joints, elevation(s) above structural floor, and other special features of the elevated floor system.
2. Location and design of ramps, steps, and doors to access floor area; railing heights and design.
3. Location and sizes of registers, grilles, perforated panels, and cable openings through access floor panels.
4. Design and type of plenum fire extinguishing systems, if space under access floor is to be used as air plenum.
5. Layout of plenum dividers.
6. Pattern of access floor panels.
7. Location of building electrode. Coordinate structural grounding connections with appropriate building and electrical systems.

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 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 ASSOCIATION OF TEXTILE CHEMISTS AND COLORISTS (AATCC)

AATCC 134

(2006) Standard Test Method for
Electrostatic Propensity of Carpets

AATCC 16 (2004) Colorfastness to Light

APA - THE ENGINEERED WOOD ASSOCIATION (APA)

APA EWCG (2005) Engineered Wood Construction Guide: Building Requirements and Related Panel Systems

APA PS 1 (1995) Voluntary Product Standard for Construction and Industrial Plywood

ASTM INTERNATIONAL (ASTM)

ASTM A 780 (2001; R 2006) Standard Practice for Repair of Damaged and Uncoated Areas of Hot-Dip Galvanized Coatings

ASTM B 85 (2003) Standard Specification for Aluminum-Alloy Die Castings

ASTM E 648 (2006a) Standard Test Method for Critical Radiant Flux of Floor-Covering Systems Using a Radiant Heat Energy Source

ASTM E 84 (2007) Standard Test Method for Surface Burning Characteristics of Building Materials

ASTM F 1066 (2004) Standard Specification for Vinyl Composition Floor Tile

CEILINGS & INTERIOR SYSTEMS CONSTRUCTION ASSOCIATION (CISCA)

CISCA Access Floors (2004) Test Procedures for Access Floors

COMPOSITE PANEL ASSOCIATION (CPA)

CPA A208.1 (2002) Medium Density Fiberboard (MDF) For Interior Applications

CPA A208.2 Medium Density Fiberboard (MDF) for Interior Applications

ICC EVALUATION SERVICE, INC. (ICC-ES)

ICC-ES AC300 (2005) Acceptance Criteria for Access Floors

INTERNATIONAL CODE COUNCIL (ICC)

ICC IBC (2003) International Building Code

NATIONAL ELECTRICAL MANUFACTURERS ASSOCIATION (NEMA)

NEMA LD 3 (2005) Standard for High-Pressure Decorative Laminates

NATIONAL FIRE PROTECTION ASSOCIATION (NFPA)

NFPA 75 (2003; Errata 2003) Protection of
Information Technology Equipment

NFPA 99 (2005; Errata 2005) Health Care Facilities

U.S. GENERAL SERVICES ADMINISTRATION (GSA)

FS TT-C-490 (1990; Am 2) Cleaning Methods for Ferrous
Surfaces and Pretreatments for Organic
Coatings

UNDERWRITERS LABORATORIES (UL)

UL 779 (1995; Rev thru Nov 2005) Electrically
Conductive Floorings

1.2 SUBMITTALS

NOTE: Review submittal description (SD) definitions
in Section 01 33 00 SUBMITTAL PROCEDURES and edit
the following list to reflect only the submittals
required for the project. Submittals should be kept
to the minimum required for adequate quality control.

A "G" following a submittal item indicates that the
submittal requires Government approval. Some
submittals are already marked with a "G". Only
delete an existing "G" if the submittal item is not
complex and can be reviewed through the Contractor's
Quality Control system. Only add a "G" if the
submittal is sufficiently important or complex in
context of the project.

For submittals requiring Government approval on Army
projects, a code of up to three characters within
the submittal tags may be used following the "G"
designation 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.

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" designation;
submittals not having a "G" designation are for [Contractor Quality Control
approval.] [information only. When used, a designation following the "G"
designation 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

Detailed Installation Drawings[; G][; G, [____]]

Drawings showing location, details at floor perimeter, method of anchorage to structural subfloor, grounding, description of [shop][factory] coating, installation height above structural floor, stairs, ramps, accessories and other details as specified.

SD-03 Product Data

Access Flooring System

Manufacturer's descriptive data, catalog cuts, and installation instructions. The data must include information about any design and production techniques, total system including all accessories and finish coatings of under-floor components, procedures and policies used to conserve energy, reduce material, improve waste management or incorporate green building/recycled products into the manufacturer of their components or products. Cleaning and maintenance instructions must be included.

NOTE: Zinc whiskers can occur on the underside of raised floor systems which are treated with a zinc electroplated anti-corrosion coating. Zinc whiskers are small enough (2 microns in diameter up to several millimeters in length) to render normal dust filters on computer equipment ineffective. The result is possible electrical shorts and damage to circuitry and equipment.

Systems which contain zinc electroplated anti-corrosion coatings are prohibited.

SD-04 Samples

[Three][____] complete Floor Panels
[Three][____] separate samples of the specified Finish Flooring
Panel Support System
Accessories

[One sample of each panel type and suspension system proposed for use.]

SD-05 Design Data

Compliance with ICC-ES AC300

Design data substantiating compliance with International Building Code Acceptance Criteria for Access Floors.

Seismic Calculations

Design calculations which demonstrate that the proposed floor system meets requirements for seismic loading. Certified copies

of test reports may be submitted in lieu of calculations.

SD-06 Test Reports

Factory Tests
Electrical Resistance
Field Tests

Certified copies of test reports from an approved testing laboratory, attesting that the proposed floor system components meet the performance requirements specified.

SD-07 Certificates

Access Flooring System

Certificate of compliance attesting that the installed access floor system meets specification requirements, including all special equipment loads and specific electrical and or cable requirements.

1.3 SYSTEM DESCRIPTION

NOTE: Access flooring support systems are available as either a stringer or stringerless system. Refer to Section 09 69 13 RIGID GRID ACCESS FLOORING for applications using stringers.

Consideration should be given to loads which will be imposed during operation. Some equipment, such as high speed printers require large quantities of paper to be delivered by carts. When in motion, these heavy loads may exceed capacity of floor system. Check with user activity and floor system manufacturer when heavy rolling loads are expected.

Access flooring must be installed at the location and elevation and in the arrangement shown on the drawings. The floor system must be of the stringerless type, complete with all supplemental items, and be the standard product of a manufacturer specializing in the manufacture of access flooring systems.

a. Provide for self-alignment of floor panels, adjustable pedestals and readily removable floor panels covered as specified.

b. Lateral stability of floor support system must be integral with panels. Finished assembly must be stable and free of vibration, noises, and rocking panels.[Provide stringerless system with equipotential plane grounding.]

c. Submit Certificates for the complete Access Flooring System including, but not limited to the following:

1) Compliance with ICC-ES AC300.

2) Load-bearing capabilities of pedestals, floor panels, and pedestal adhesive resisting force.

3) Supporting independent laboratory test reports. For panel loads, test results include concentrated loads at center of panel, panel edge midpoint, and uniform loads.

4) Floor electrical characteristics.

5) Material requirements

6) Elevated floor system must be free of defects in materials, fabrication, finish, and installation for a period of not less than [_____] years after completion.

d. The Contractor warrants that, upon notification by the Government, defective work will be immediately replaced with new work at no additional cost to the Government.

1.3.1 Allowable Tolerances

a. Floor Panel Flatness: Plus or minus 0.5 mm 0.02 inches on diagonal on top of panel or underneath edge.

b. Floor Panel Length: Plus or minus 0.4 mm 0.015 inch.

c. Floor Panel Squareness: Plus or minus 0.5 mm 0.02 inch in panel length.

d. Finish Floor: Level within plus or minus 1.6 mm in 2 m 0.062 inch in 10 feet, and plus or minus 2.5 mm 0.10 inch for entire floor.

1.3.2 Floor Panels

NOTE: Insert heavier load as required by facility use conditions. The deflection and permanent deformation limits for panels are 610 by 610 mm (24 by 24 inches), and smaller.

Check manufacturer's literature for maximum loadings available. Generally, computer rooms are based on live load of 12 kPa (250 psf) and point load of 450 kg (1000 lbs). Coordinate design loads for access floor with design of structural slab.

For Navy projects design loads will be in accordance with the International Building Code and NAVFAC P-355.

Floor panel testing must be conducted in accordance with CISCA Access Floors. When tested as specified, all deflection and deformation measurements must be made at the point of load application on the top surface of the panel. Floor panels must be capable of supporting the following loads:

a. Concentrated load of [4450] [5563] [6675] [_____] N [1000] [1250] [1500] [_____] pounds on 645 square mm one square inch, at any point on panel, without deflecting more than 2 mm 0.08 inch, with a safety factor of 2 based on static design load, without permanent deformation in excess of 0.25 mm 0.01 inch in any of the specified tests.

- b. Uniform live load of [11.97] [14.36] [16.76] [_____] kPa/square meter [250] [300] [350] [_____] psf, without deflecting more than 1 mm 0.04 inch.
- c. A rolling load of [_____] kg pounds applied through hard rubber surfaced wheel 150 mm 6 inch diameter by 50 mm 1 1/2 inch wide for 10,000 cycles over the same path. Permanent set at conclusion of test shall not exceed 0.25 mm 0.010 inch.
- d. A rolling load of [2670] [4450] [_____] N [600] [1000] [_____] pounds applied through a 75 mm 3 inch diameter by 30 mm 1-13/16 inch wide caster for 10 cycles over the same path, without deflecting more than 1 mm 0.04 inch and without permanent deformation in excess of 0.5 mm 0.02 inch. In accordance with CISCA Access Floors, the permanent deformation limit under rolling load shall be satisfied in all of the specified tests. In the specified tests, the permanent deformation shall be measured after 10 passes with Wheel 1 and after 10,000 passes with Wheel 2.
- e. An impact load of [_____] kg on 645 square mm pounds on one square inch from a height of 300 mm 12 inches with permanent set not to exceed 1.5 mm 0.060 inch.

1.3.3 Pedestals

NOTE: Pedestals consist of a base plate, post and an adjustable head, and are available in heights from 150 mm (6 inches) to 2400 mm (96 inches).

Pedestals are normally held in place with an adhesive and must be in full contact with the subfloor surface. Pedestal 600 mm (24 inches) high or higher will be securely anchored to the structural floor in addition to the adhesive.

For Air Force projects, the minimum pedestal height is 300 mm (12 inches).

Pedestals must be capable of supporting a 22.24 kN 5000 pound axial load without permanent deformation.

1.3.4 Bonding Strength of Pedestal Adhesive

NOTE: Use 113 Nm (1,000 lbf-in) for raised floors with a maximum height of 610 mm (24 inches) and 226 Nm (2,000 lbf-in) for raised floor heights greater than 610 mm (24 inches) up to 1219 mm (48 inches) maximum. Raised floor heights greater than 1219 mm (48 inches) require specific structurally designed bracing.

Adhesive for anchoring pedestal bases must have a bonding strength capable of resisting an overturning moment of [113 Nm 1,000 lbf-in] [_____] when a force is applied to the top of the pedestal in any direction.

1.3.5 Bond Strength of Factory Installed Covering

Bond strength of floor covering must be sufficient to permit handling of the panels by use of the panel lifting device, and to withstand moving caster loads up to 4.45 kN 1000 pounds, without separation of the covering from the panel.

1.3.6 Seismic Calculations

1.3.6.1 Navy Requirements

NOTE: For Navy projects, provide lateral bracing calculations on all installations. Level 1 Contracting Officer's approval was granted for calculations by a registered professional engineer. Occupancy importance factor (I) and seismic zone factor (z) should be deleted in accordance with NAVFAC P-355.

Submit seismic calculations for lateral bracing, sealed by a Professional Engineer. Document that access flooring system complies with seismic requirements of ICC IBC and ICC-ES AC300 for Occupancy Importance Factor (I) of [1.5] [1.25] [1.0], Seismic Zone Coefficient (Z) of [0.075] [0.15] [0.20] [0.30] [0.40] and Horizontal Force Factor (Cp) of 0.75.

1.3.6.2 Army Requirements

NOTE: Provide seismic requirements, if a Government designer (Corps office or A/E) is the Engineer of Record, and show on the drawings. Delete the second bracketed phrase if seismic details are not provided. Pertinent portions of UFC 3-310-04 and Section 13 48 00 SEISMIC PROTECTION FOR MISCELLANEOUS EQUIPMENT must be included in the contract documents.

Submit calculations for special bracing to resist the effects of seismic or other forces [in accordance with UFC 3-310-04, ICC IBC and ICC-ES AC300] [as shown on the approved detailed installation drawings].

1.3.7 Air Leakage

NOTE: Delete the requirements for air leakage when the space under the finished floor is not used as an air plenum. Concrete floors to be used as air plenums must be sealed and coated.

When the space below the finished floor is to be an air plenum, air leakage through the joints between panels and around the perimeter of the floor system must not exceed 0.15 L/s of air per linear meter 0.1 cubic foot of air per minute per linear foot of joint subjected to 2.5 mm 0.1 inch, water gauge, positive pressure in the plenum.

1.3.8 Grounding

NOTE: Access flooring system must be grounded for safety hazard and static control. The three most common static control requirements are:

1. Computer rooms, electronic offices, data centers and control rooms. The access floor system should provide resistance from floor wearing surface to building grounding electrode within range of 0.5 to 20,000 megohms.

2. Clean rooms, laboratories, and other environments which are more sensitive to static discharge. The access floor system should provide resistance within range of 0.2 to 2.0 megohms.

3. Hospitals and other facilities described by NFPA 99 and referenced to UL 779. The access floor system should provide resistance within range of 0.025 to 1.0 megohms.

These limits may be changed if other values are required by the Using Agency. Design the grounded floor system to provide positive contact between all metal components. Grounding details must be shown on the project drawings; the option of using manufacturer's alternate methods of grounding may be included in the project specification.

The access flooring system must be grounded for safety hazard and static suppression. Provide positive contact between components for safe, continuous electrical grounding of entire floor system. Total system resistance from wearing surface of floor to building grounding electrode must be within range of [0.5 to 20,000 megohms] [0.2 to 2.0 megohms] [0.025 to 1.0 megohms].

1.3.8.1 Metal Grilles

Exposed metal is not allowed at wearing surface of access floor system, except at metal grilles and registers. When grilles and metal registers are provided, insulate as required to provide same grounding resistance as wearing surface.

1.3.8.2 Joint Resistance

NOTE: Coordinate with electrical drawings and specifications to assure that connection to building grounding electrode is shown. Do not use sound deadening materials which prevent grounding of system. Select a total system resistance to comply with user requirements.

Electrical resistance between pedestals and floor panels as mounted in

normal use must be less than 3 ohms.

1.4 DELIVERY, STORAGE, AND HANDLING

1.4.1 Delivery

Deliver materials to site in undamaged condition, in original containers or packages, complete with accessories and instructions. Label packages with manufacturer's name and brand designations. Materials covered by specific references must be packaged bearing specification number, type and class as applicable.

1.4.2 Storage

Store all materials in original protective packaging in a safe, dry, and clean location. Panels must be stored at temperatures between 4 and 32 degrees C 40 and 90 degrees F, and between 20 and 70 percent humidity. Replace defective or damaged materials.

1.4.3 Handling

Materials must be handled and protected in a manner to prevent damage during the entire construction period.

1.5 EXTRA MATERIALS

NOTE: To assure matching floor panel which may become damaged and require replacement, supply of extra stock is recommended. Set amount based on conditions of specific project. Do not specify extra stock unless user activity concurs; warehousing may not be available.

Select the appropriate paragraph for the agency indicated, and delete the remaining two.

[a. ARMY: Spare floor panels and spare complete pedestal assemblies must be furnished at the rate of one for each 100 or fraction thereof required.]

[b. NAVY: Provide [four] [_____] floor panels complete with specified floor covering for future use.]

[c. [AIR FORCE][NASA]: Provide four spare panels with identical finish flooring pedestals for each 100 square m 1,000 square feet of access flooring and total of 3 linear m 10 linear feet of cut-out trim. Store extra stock in same manner and location as project materials.]

1.6 DETAILED INSTALLATION DRAWINGS

The Contractor must take measurements from finished areas at site and submit detail drawings indicating:

- a. Location of panels.
- b. Layout of supports, panels, and cutout locations.
- c. Stair, handrail, and ramp framing.

- d. Sizes and details of components.
- e. Lateral bracing.
- f. Typical cutout details.
- g. Gasketing, return air grilles, supply air registers, and perforated panels. Include air transfer capacity of grilles, registers and panels.
- h. Floor finishes.
- i. Location of connection to building grounding electrode.

PART 2 PRODUCTS

NOTE: The designer should consider incorporating, when possible, any design provisions which encourage use of innovative construction materials or techniques which are environmentally sensitive, take advantage of recycled materials, and conserve our natural resources.

2.1 FLOOR PANELS

2.1.1 Floor System Drawings And Planer Quality

- a. Submit Fabrication Drawings for elevated floor systems consisting of fabrication and assembly details to be performed in the factory.
- b. Indicate on Location Drawings exact location of pedestals, ventilation openings, cable cutouts, and the panel installation pattern.
- c. Provide Detail Drawings showing details of the pedestals, pedestal-floor interlocks, floor panels, panel edging, floor openings, floor opening edging, floor registers, floor grilles, cable cutout treatment, perimeter base, expansion joints, and peripheral support facilities.
- d. Design and workmanship of the floor, as installed, must be completely planar within plus or minus 1.5 mm in 3050 mm 0.060 inch in 10 feet, 2.5 mm 0.100 inch for the entire floor, and 0.7 mm 0.030 inch across panel joints.
- d. Floor-panel joint-width tolerances must be 0.20 mm 0.008 inch as measured with a feeler gage at any point in any joint when the panels are in the pressure contact required in final installation.

2.1.2 Panel Construction

NOTE: There are five basic floor panel types: aluminum, hollow formed steel, metal-clad cementitious fill, metal-clad wood core, and concrete. Nonferrous materials should be used in areas where there is potential for damage by rust oxides or paint flakes. In accordance with CISCA

Test Method, filled panels must have a safety factor of 3 in terms of ultimate load.

The standard panel size of 600 by 600 mm (24 by 24 inch) or 1200 by 1200 mm (48 by 48 inch) will normally be used. Check with user activity and verify product availability before specifying nonstandard panels of 450, 750 and 900 mm (18, 30, and 36 inch) where required to match existing floor systems or to satisfy special requirements.

Use 150 mm (6 inches) as minimum practical height for access floor installation and 300 mm (12 inches) minimum when there is a plenum. Include the five panel types as options except that wood core panels should not be specified for Air Force projects, NASA projects, SPAWARS projects, or other projects where data processing involves highly strategic data having direct bearing on National Defense effort. Check with user activity before specifying wood core panels.

- a. Base access floor system on a 600 by 600 mm 24 by 24 inch square module providing minimum of [150] [300] [_____] mm [6] [12] [_____] inch clearance between structural floor and bottom of finished floor. Fabricate so accurate job cutting and fitting may be done using standard sizes for perimeters and around columns.
- b. Do not expose metal on finished top surface of panels. Provide cutouts and cutout closures to accommodate utility systems and equipment intercabling. Reinforce cutouts to meet design load requirements. Provide extra support pedestals at each corner of cutout for cutout panels that do not meet specified design load requirements.
- c. Panel design must provide for convenient panel removal for underfloor servicing and for openings for new equipment. Use panels of uniform dimensions within specified tolerances. Panels must be permanently marked to indicate load rating and model number.
- d. Floor panels must be machined square to within plus or minus 0.13 mm 0.005 inch with edge straightness plus or minus 0.064 mm 0.0025 inch. Tolerances apply to the panel before the plastic edging is applied.

[2.1.2.1 Aluminum

NOTE: Die-cast aluminum panels are lightweight, have very little variation in dimension from panel to panel, and are acceptable in environments where nonferrous materials are required (e.g., Magnetic Resonance Imagery rooms), but they tend to be more expensive than other types of panels.

Die-cast aluminum panels are normally used as a stringerless system.

Aluminum panels must be of die-cast or extruded construction conforming to

ASTM B 85.

] [2.1.2.2 Hollow Formed Steel

NOTE: Die-formed hollow steel panels perform best under static loads and should not be used under dynamic (rolling) loads. These panels are more economical than other types of panels and can be provided by most flooring system manufacturers.

Steel panels must be of die-formed construction, consisting of a flat steel top sheet welded to one or more formed steel stiffener sheets or components. Panels must be chemically cleaned, bonderized, and painted with the manufacturer's standard finish.

] [2.1.2.3 Metal-Clad Cementitious Fill (Composite Panels)

NOTE: Cementitious core filled panels are enclosed in steel sheeting and are designed to provide improved resistance to rolling and impact loads. Specific strength and load requirements should be specified wherever it is a critical concern. These panels are quiet due to their mass, but usually cost slightly more than the standard formed steel panels.

There is some concern that the fill material may deteriorate when subjected to repeated loading cycles, and the cut edges could introduce dust into the underfloor space. Where the underfloor space will be a plenum, or where dust-sensitive computer equipment is to be installed, verify that the composite panel is acceptable to the Using Agency.

Current Air Force criteria does not permit the composite panel.

Composite panels must be of die-formed steel construction totally enclosing the panel, including the top surface. The void spaces between the top sheet and the formed steel bottom sheet must be completely filled with an incombustible cementitious or concrete material. Seal cut edges in accordance with manufacturer's recommendations.

] [2.1.2.4 Metal-Clad Wood Core

NOTE: Wood core panels consist of a core of particleboard with an overlapping skin of galvanized steel. The wood core is a good sound deadener and insulator and increases resistance to rolling loads. Wood core panels are the most economical to procure.

Although the core material is combustible, the composite panel with bonded steel for face sheets when tested in accordance with the NFPA 225,

revealed the composite panel to be noncombustible with a flame spread index of 0, a smoke developed index of 10, and to have a Class A fire rating.

Wood core panels can be easily cut and trimmed; however, doing so causes loss of fire retardancy and UL rating. The edges of wood core panels must be protected from moisture in order to prevent warping.

Wood core panels must have cores of wood particleboard conforming to [CPA A208.1](#), Grade 1-M-3, or of plywood conforming to [CPA A208.2](#), [APA EWCG](#), and [APA PS 1](#), EXT-DFPA-C-C. The core must be not less than 25 mm 1 inch thick, and be faced on both sides with structurally bonded zinc-coated steel sheets not lighter than 0.70 mm 24 gauge. All edges and corners must be sealed with zinc-coated steel or extruded aluminum. The completed panels must have a flame spread rating of 25 or less when tested in accordance with [ASTM E 84](#). Provide zinc-coated steel, extruded aluminum, fire resistant vinyl, or other fire resistant edging to protect shop and field edge cuts and cutouts through the face of panels in a manner to meet specified flame spread requirements.

] 2.1.2.5 Lightweight Concrete Panels

NOTE: Lightweight concrete panels are either solid or metal clad. They perform well under dynamic loadings with little deformation and their weight is approximately 195 kg/m² (40 psf). They are primarily used in office flooring and are similar in cost to cementitious fill panels.

Lightweight Concrete panels must be of lightweight structural concrete with either structural reinforcing or a die-formed, electro-galvanized steel bottom pan. All concrete surfaces including those resulting from field cuts must be sealed with the manufacturer's standard sealer before covering the surfaces with other materials.

] 2.1.3 Floor Covering

Floor panels must be surfaced with materials firmly bonded in place with waterproof adhesive. The electrical resistance must remain stable over the life expectancy of the floor covering. Any anti-static agent used in the manufacturing process must be an integral part of the material, and must not be surface applied. Bolt heads or similar attachments must not rise above the traffic surface.

2.1.3.1 High Pressure Laminate

NOTE: High pressure laminate is the standard surfacing material and is preferred where cost is not an overriding factor.

Grade HW-120, approximately 3 mm (1/8 inch) thick, is recommended on metal floor panels to reduce the possibility of cracking due to impact. On wood core, filled steel and concrete panels, Grade HW-62,

1.5 mm (1/16 inch) thick is sufficient due to absorptive quality of panel material. This option is recommended when there is frequent movement of equipment.

High pressure laminate surfacing must conform to NEMA LD 3, Grade [HW 62] [120]. Total system electrical resistance from the wearing surface of the floor to the ground connection must be between 150,000 ohms and 20,000,000,000 ohms.

2.1.3.2 Conductive Surfacing

NOTE: Conductive floor surfacing material is used where minimal electrical resistance is desired, mainly in clean rooms, hospital operating rooms, etc. The surface does not perform well under the application of heavy concentrated loads.

When conductive floor surfacing is specified, require submittal of maintenance instructions as per paragraph OPERATION AND MAINTENANCE MANUALS to identify special cleaning and maintenance requirements to maintain "conductive" properties of the panel finishes.

Conductive surfacing must conform to NEMA LD 3, Grade HW 62. The total system electrical resistance from the wearing surface of the floor to the ground connection must be between 25,000 ohms and 1,000,000 ohms.

2.1.3.3 Conductive High Pressure Laminate

NOTE: Conductive high pressure laminate floor surfaces combine the electrical resistance qualities of the conductive surfacing with the wear characteristics of high pressure laminate.

Conductive high pressure laminate floor surfacing must conform to ASTM F 1066, Type III, Vinyl Tile and UL 779. The total system electrical resistance from the wearing surface of the floor to the ground connection shall be between 25,000 ohms and 1,000,000 ohms.

2.1.3.4 Vinyl Composition Tile

NOTE: Vinyl composition tile is the lowest cost surfacing tile, however the availability of tile meeting the electrical resistance requirements is limited. Wax build-up on vinyl tile is a prime cause of static problems.

Normally either Composition 1 or 2 will be specified; however Composition 1 should be specified when the Using Agency desires an asbestos-free material. ASTM F 1066, Type II - Rubber or Type III

- Vinyl tile may be specified when requested; however the electrical resistance characteristics should be verified before use. At installations where operating personnel will be required to wear conductive footwear to prevent static electricity buildup, conductive vinyl tile flooring may be necessary to satisfy the conductivity requirements.

Vinyl composition tile surfacing must be 3 mm 1/8 inch thick conforming to ASTM F 1066, Type IV, Composition [1] [1 or 2]. Tiles may be approximately 300 mm 12 inches square or may be the full size of the panel.

2.1.3.5 Carpet

NOTE: Carpet should be specified only when requested by the Using Agency. Carpet may be bonded to the panels, or may be installed as loose-laid carpet squares. Where loose-laid carpet squares are used, delete the test for floor covering bond strength specified in paragraph BOND STRENGTH OF FLOOR COVERING. Carpet squares may be placed with carpet joints in alignment with panel joints, or may be placed with carpet joints at the panel midpoint. Color and pattern of carpet will be in accordance with current Air Force or Army carpet policy.

Carpet surfacing must be [factory] [field] installed using one full carpet square per panel. Carpet must be nylon filament, loop pile, minimum 0.8 kg/square m 24 ounce per square yard, minimum density 4000, and without cushion. Color fastness must conform to AATCC 16. Carpet must conform to ASTM E 648 with a minimum average critical radiant flux of 0.25 watts per square centimeter. Static control must be less than 2.0 kV at 20 percent relative humidity at 21 degrees C 70 degrees F, when tested in accordance with AATCC 134. Provide vinyl edge trim to prevent unraveling.

2.1.4 Edge Strip

Panels must be edged with extruded vinyl edge strips secured in place with mechanical interlock or adhesive bond, or must be of a replaceable type. Top of strip must be approximately 3 mm 1/8 inch wide, and must be flush with the floor surfacing. Metal edge strips exposed at finish floor surface will be rejected.

2.1.5 Accessories

NOTE: Perforated panels are preferred for use in areas with hard surfaces such as high pressure laminates, and grilles or registers are preferred in areas with carpet

Registers, grilles, perforated panels, and plenum dividers must be provided where indicated, and must be the manufacturer's standard type. Registers, grilles, and perforated panels must be designed to support the same static loads as floor panels without structural failure, and must be capable of

delivering the air volumes indicated. Registers and perforated panels must be 25 percent open area and must be equipped with adjustable dampers.

2.1.6 Resilient Base

Base must be [rubber] [or] [vinyl] [straight style (installed with carpet)] [coved style (installed with resilient flooring)]. Base must be [100] [150] mm [4] [6] inches high and a minimum 3 mm 1/8 inch thick. [Preformed off site] [Job Formed] corners must be furnished.

2.1.7 Lifting Device

Each individual room must be provided with one floor panel lifting device standard with the floor manufacturer. A minimum of two devices must be furnished. [For AIR FORCE projects provide a total of two suction-type floor panel lifting devices for each floor area.]

2.2 PANEL SUPPORT SYSTEM

Design panel and pedestal support system to allow for 360 degree clearance in laying out cable and cutouts for service to machines. Pedestals must be of steel or aluminum or a combination thereof. Ferrous materials must have a factory-applied corrosion-resistant finish. Pedestal base plates must provide a minimum of 10,300 square mm 16 square inches of bearing surface and must be a minimum of 3 mm 1/8 inch thick. Pedestal shafts must be threaded to permit height adjustment within a range of approximately 50 mm 2 inches, to permit overall floor adjustment within plus or minus 2.5 mm 0.10 inch of the required elevation, and to permit leveling of the finished floor surface within 1.56 mm 0.062 inch in 3000 mm 10 feet in all directions. Locking devices must be provided to positively lock the final pedestal vertical adjustments in place. Pedestal caps must interlock with panels to preclude tilting or rocking of the panels.

2.3 FASCIA

Aluminum or steel fascia plates must be provided at open ends of floor, at sides of ramps and steps, and elsewhere as required to enclose the free area under the raised floor. Steel plates must have a factory applied baked enamel finish. Finish on aluminum plates must be as standard with the floor system manufacturer. Fascia plates must be reinforced on the back, and must be supported using the manufacturer's standard lateral bracing at maximum 1200 mm 4 feet on center. Trim, angles, and fasteners must be provided as required.

2.4 STEPS AND RAMPS

Steps and ramps must be securely fastened to the access flooring system and to the structural floor. Construction must include standard floor system components and custom components as required, and must include all supports, fasteners, and trim necessary for a finished installation. Step nosings, threshold strips, and floor bevel strips must be cast or extruded aluminum with non-slip traffic surfaces.

2.4.1 Steps

Height of risers must not exceed 180 mm 7 inches. Steps must be designed to support a uniform load of 7.18 kPa 150 psf. Treads must be surfaced with the manufacturer's standard non-slip floor finish.

2.4.2 Ramps

Slope of ramps must not exceed 25 mm 1 inch rise to 300 mm 12 inches of run. Ramps must be designed to support the same loads as specified for floor panels. Ramps must be surfaced with the manufacturer's standard non-slip floor finish.

2.5 RAILINGS

NOTE: Where open sides of floors are 1200 mm (4 feet) or more above adjacent ground or floor level, "standard railing" shall be installed in accordance with CFR 1910.23(e). Run post through raised floor and bolt to concrete floor for stability.

Railings must be the double rail and post type, fabricated of at least [25 mm 1 inch] [_____] [round] [square] seamless [aluminum tubing] [_____] with a [satin natural anodized] [_____] finish. At steps and ramps, the top rail must be a minimum of 900 mm 36 inches high and parallel to the incline. The top rail must be 1050 mm 42 inches high at open ends of the floor. Guardrails must have intermediate rails or an ornamental pattern such that a sphere 100 mm 4 inches in diameter cannot pass through. Space posts maximum of [1200] [1500] [1800] mm [4] [5] [6] feet oc. Provide railings complete with anchorages, floor plates, and end caps. [Electronically ground hand rails to raised floor system to prevent static build-up.]

2.6 FACTORY TESTS

Access flooring must be factory tested by an independent laboratory at the same position and maximum design elevation and in the same arrangement as shown on the drawings for installation so as to duplicate service conditions as much as possible.

2.6.1 Load Tests

Floor panel and pedestal testing must be conducted in accordance with CISCA Access Floors.

2.6.2 Bond Strength of Covering

The test panel must be supported on pedestals as specified for the installed floor. The pedestal supports must be braced as necessary to prevent sideways movement during the test. A test load of 4.45 kN 1000 pounds must be imposed on the test assembly through a hard plastic caster 75 mm 3 inches in diameter and 25 mm 1 inchwide. The caster must be rolled completely across the center of the panel. The panel must withstand 20 passes of the caster with no delamination or separation of the covering.

2.7 COLOR

NOTE: Editing of color reference sentence(s) shall be coordinated with the Government. Generally the 09915 COLOR SCHEDULE or drawing is used when the project is designed by an Architect or Interior designer. Color shall be selected from manufacturers standard colors or identified as a

manufacturers color in this specification only when
the project is very simple and has minimal finishes.

When the Government directs that color be located in the drawings a note shall be added that states:
"Where color is shown as being specific to one manufacturer, an equivalent color by another manufacturer may be submitted for approval. Manufacturers and materials specified are not intended to limit the selection of equal colors from other manufacturers. The word "color" as used herein includes surface color and pattern."

Prior to specifying a custom color finish, research to determine if additional cost and lead time is feasible. Note there is often a minimum order requirement; this requirement will also affect future orders.

When a manufacturer's name, stock number, pattern, and color is used, be certain that the product conforms to this specification, as edited.

Color must be [in accordance with Section 09 06 90 COLOR SCHEDULE.] [as indicated on the drawings.] [selected from manufacturers standard colors.] [_____]. Color listed is not intended to limit the selection of equal colors from other manufacturers.

[2.8 REGISTERS AND GRILLES

NOTE: Delete paragraph heading and paragraph if they are not applicable. Size of registers should be stated if applicable.

Registers and grilles must be [_____] mm inches by [_____] mm inches long with a minimum free area of [_____] square mm inches. Material must be extruded [aluminum] [_____] , in [mill] [_____] finish, to sustain point loads of 1100 newton 250 pounds per vane without failure or permanent deformation. No part of a grille may project more than 3 mm 1/8 inch above the floor.

Registers and grills are not permitted in a laminate floor tile system.

] [2.9 PERFORATED AIR SUPPLY PANELS

NOTE: Delete the paragraph heading and following paragraph if not applicable.

Air supply floor panels must meet the design criteria specified for standard panels. Air supply panels must be fabricated of 2 mm 14-gage perforated steel sheet welded to minimum 1.6 mm 16-gage side channels, and be covered with plastic laminate to match standard panels, and have a uniform perforated pattern to allow even air distribution

] [2.10 CUT OUTS

NOTE: Delete the paragraph heading and paragraph if
cutouts are not applicable.

a. Provide cable cutouts finished with rigid polyvinylchloride or molded polypropylene edging to conform to the appearance level of the floor surface and to cover raw edges of the cutout panel. Extrusion must be of a configuration to permit its effective and convenient use when new cable openings are required. Provide at least 7300 mm 24 feet of additional extrusion for future use.

b. Provide non-metallic adapter for openings less than 100 mm 4 inches wide. Secure adapter adhesively in cutout to preclude removal from panel. Provide at least two adapters per 10 square m 1000 square feet for future use.

c. Openings larger than 100 mm 4 inches wide must use rigid polyvinylchloride or molded polypropylene edging. Cutting of panels, including cutouts, must be performed outside of the building.

] [2.11 EDGE CLOSURE

NOTE: Delete the paragraph heading and paragraph if
cutouts are not applicable.

Provide 1.5 mm 1/16 inch aluminum closure plate and extruded aluminum nosing at exposed edge of floor. Back up the closure plates with aluminum or steel framing braced diagonally, or anchor at bottom to continuous angle.

] PART 3 EXECUTION

3.1 INSTALLATION

The floor system must be installed in accordance with the manufacturer's instructions and with the approved detail drawings. Open ends of the floor, where the floor system does not abut wall or other construction, must have positive anchorage and rigid support. Areas to receive access flooring must be maintained between [16] [4] and 32 degrees C [60] [40] and 90 degrees F, and between 20 and 70 percent humidity for 24 hours prior to and during installation.

3.1.1 Preparation for Installation

NOTE: Section 03 31 00.00 10 CAST-IN-PLACE
STRUCTURAL CONCRETE should require that concrete
floors used as air plenum surfaces beneath raised
floors be sealed with approved low VOC liquid sealer
compound. Sealer should be compatible with pedestal
adhesive, if pedestals are anchored with adhesive.
If a non-compatible sealer is applied before
pedestals are anchored, specify removal of sealer at
pedestal locations before adhesive is applied. If
an existing subfloor has been painted or otherwise

sealed with non-compatible sealer or paint, specify
removal of coating before applying adhesive.

The area in which the floor system is to be installed must be cleared of all debris. Structural floor surfaces must be thoroughly cleaned and all dust must be removed. Floor coatings required for dust or vapor control must be installed prior to installation of pedestals only if the pedestal adhesive will not damage the coating. If the coating and adhesive are not compatible, the coating must be applied after the pedestals have been installed and the adhesive has cured.

3.1.2 Pedestals

NOTE: Seismic calculations must be made by the designer to determine if adhesives or anchors are to be used; pedestal adhesives must be capable of securing pedestals in place with sufficient bonding strength to resist an overturning force of 113 N-m (1000 inch-pounds). If the calculations indicate the overturning force is greater than 113 N-m (1000 inch-pounds) steel expansion anchors must be used.

Pedestals must be accurately spaced, and must be set plumb and in true alignment. Base plates must be in full and firm contact with the structural floor, [and must be secured to the structural floor with adhesive.] [and must be secured to the structural floor with steel expansion anchors.]

3.1.3 Auxiliary Framing

Provide auxiliary framing or pedestals around columns and other permanent construction, at sides of ramps, at open ends of the floor, and beneath panels that are substantially cut to accommodate utility systems. Special framing for additional lateral support must be as shown on the approved detail drawings. Provide additional pedestals designed to specific heights and lengths to meet structural irregularities and design loads. Connect auxiliary framing to main framing.

3.1.4 Panels

Interlock panels with supports in a manner that will preclude lateral movement. Perimeter panels, cutout panels, and panels adjoining columns, stairs, and ramps must be fastened to the supporting components to form a rigid boundary for the interior panels. Floors must be level within the specified tolerances. Cut edges of [steel and wood-core panels must be [painted] [finished] [_____] as recommended by the panel manufacturer.] [composite panels must be coated with a silicone rubber sealant or with an adhesive recommended by the panel manufacturer.] Extruded vinyl edging must be secured in place at all cut edges of all panel cut-outs to prevent abrasion of cables. [Where the space below the floor is a plenum, cutouts for conduit and similar penetrations must be closed using self-extinguishing sponge rubber.]

3.1.5 Resilient Base

Base must be provided at vertical wall intersections. Cracks and voids in

walls and other vertical surfaces to receive base must be filled with an approved filler. The base must be applied after the floor system has been completely installed. Base must be applied with adhesive in accordance with the base manufacturer's recommendations.

3.1.6 Fascia Plates

Exposed floor ends and exposed openings of ramps and stairs must be covered with [aluminum] [steel closures] [finish material as indicated on the detailed drawings.].

3.1.7 Repair of Zinc Coating

Zinc coating that has been damaged, and cut edges of zinc-coated components and accessories, must be repaired by the application of a galvanizing repair paint conforming to **ASTM A 780**. Areas to be repaired must be thoroughly cleaned prior to application of the paint.

3.2 FIELD TESTS

3.2.1 Acceptance Tests

Conduct acceptance tests after installation of floor system. Make at least one test for each [40] [100] [_____] square meters [400] [1000] [_____] square feet of floor area. Conduct tests in presence of Contracting Officer and representatives of manufacturer and installer.

3.2.2 Electrical Resistance

Testing of electrical resistance in the completed installation must be conducted in the presence of the Contracting Officer. Testing must be in accordance with **NFPA 99** modified by placing one electrode on the center of the panel surface and connecting the other electrode to the metal flooring support. Measurements must be made at five or more locations. Each measurement must be the average of five readings of 15 seconds duration at each location. During the tests, relative humidity must be 45 to 55 percent and temperature must be **21 to 24 degrees C 69 to 75 degrees F**. Select panels used in the testing at random and include two panels most distant from the ground connection. Electrical resistance must be measured with instruments that are accurate within 2 percent and that have been calibrated within 60 days prior to the performance of the resistance tests. The metal-to-metal resistance from panel to supporting pedestal must not exceed 10 ohms. The resistance between the wearing surface of the floor covering and the ground connection, as measured on the completed installation, must be in accordance with paragraph FLOOR COVERING.

3.3 CLEANING AND PROTECTION

3.3.1 Cleaning

The space below the completed floor must be free of all debris. Before any traffic or other work on the completed raised floor is started, clean the completed floor in accordance with the floor covering manufacturer's instructions. [Do not permit seepage of cleaner between individual panels.] [Cleaning of ferrous surfaces must conform to **FS TT-C-490**.]

3.3.2 Protection

Protect traffic areas of raised floor systems with a covering of building

paper, fiberboard, or other suitable material to prevent damage to the surface. Cover cutouts with material of sufficient strength to support the loads to be encountered. Place plywood or similar material on the floor to serve as runways for installation of heavy equipment not in excess of design load capacity. Maintain protection until the raised floor system is accepted.

3.3.3 Surplus Material Removal

Surfaces of the work, and adjacent surfaces soiled as a result of the work, must be cleaned. Remove all installation equipment, surplus materials, and rubbish from the work site.

[3.4 FIRE SAFETY

An automatic detection system must be installed below the raised floor meeting the requirements of NFPA 75 paragraph 5-2.1 and must sound an audible and visual alarm. Air space below the raised floor must be subdivided into areas not exceeding 929 square meters 10,000 square feet by tight, noncombustible bulkheads. Seal all penetrations for piping and cables to maintain bulkhead properties.

] 3.5 SEISMIC SPECIAL INSPECTION AND TESTING

NOTE: Include this paragraph only when special inspection and testing for seismic-resisting systems is required by Chapter 2 of FEMA 450, NEHRP RECOMMENDED PROVISIONS FOR SEISMIC REGULATIONS FOR NEW BUILDINGS AND OTHER STRUCTURES.

This paragraph will be applicable to both new buildings designed according to UFC 3-310-04 SEISMIC DESIGN FOR BUILDINGS, and to existing building seismic rehabilitation designs.

The designer must indicate on the drawings all locations and all features for which special inspection and testing is required in accordance with UFC 3-310-04 and Chapter 2 of FEMA 450. This includes indicating the locations of all structural components and connections requiring inspection.

Add any additional requirements as necessary.

Special inspections and testing for seismic-resisting systems and components must be done in accordance with UFC 3-310-04 and Section 01 45 35 SPECIAL INSPECTION FOR SEISMIC-RESISTING SYSTEMS.

] 3.6 OPERATION AND MAINTENANCE MANUALS

Submit maintenance instructions for proper care of the floor panel surface. When conductive flooring is specified, also submit maintenance instructions to identify special cleaning and maintenance requirements to maintain "conductivity" properties of the panel finish.

-- End of Section --