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USACE / NAVFAC / AFCEC / NASA | UFGS-09 69 19 (November 2015)
Change 1 - 08/18

Preparing Activity: USACE | Superseding
UFGS-09 69 19 (November 2010)

UNIFIED FACILITIES GUIDE SPECIFICATIONS

References are in agreement with UMRL dated July 2023
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DIVISION 09 - FINISHES

SECTION 09 69 19

STRINGERLESS ACCESS FLOORING

11/15, CHG 1: 08/18

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SECTION 09 69 19

STRINGERLESS ACCESS FLOORING
11/15, CHG 1: 08/18

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UFGS Manager NOTE: (This note does not apply to the designer.) When making a change to this UFGS also make it to UFGS 09 69 13 RIGID GRID ACCESS FLOORING where applicable since the two specifications are so similar.
****

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

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 the 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)
****

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 3-301-01 or TI 800-01 Design Criteria will be accessible in accordance with 36 CFR, Part 1191, Americans with Disabilities Act (ADA-ABA) Accessibility Guidelines for Buildings

and Facilities and Architectural Barriers Act (ABA) Accessibility Guidelines.

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 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 SOCIETY OF CIVIL ENGINEERS (ASCE)

ASCE 7-16	(2017; Errata 2018; Supp 1 2018) Minimum Design Loads and Associated Criteria for Buildings and Other Structures

APA - THE ENGINEERED WOOD ASSOCIATION (APA)

APA E30	(2016) Engineered Wood Construction Guide
APA L870	(2010) Voluntary Product Standard, PS 1-09, Structural Plywood

ASTM INTERNATIONAL (ASTM)

ASTM A780/A780M	(2020) Standard Practice for Repair of Damaged and Uncoated Areas of Hot-Dip Galvanized Coatings
ASTM B85/B85M	(2018) Standard Specification for Aluminum-Alloy Die Castings
ASTM E84	(2023) Standard Test Method for Surface Burning Characteristics of Building Materials
ASTM E648	(2019a) Standard Test Method for Critical Radiant Flux of Floor-Covering Systems Using a Radiant Heat Energy Source
ASTM F150	(2006; R 2013) Standard Test Method for Electrical Resistance of Conductive and Static Dissipative Resilient Flooring
ASTM F1700	(2020) Standard Specification for Solid Vinyl Floor Tile
ASTM F1861	(2021) Standard Specification for Resilient Wall Base

CALIFORNIA DEPARTMENT OF PUBLIC HEALTH (CDPH)

CDPH SECTION 01350	(2017; Version 1.2) Standard Method for the Testing and Evaluation of Volatile Organic Chemical Emissions from Indoor Sources using Environmental Chambers

CEILINGS AND INTERIOR SYSTEMS CONSTRUCTION ASSOCIATION (CISCA)

CISCA Access Floors	(2007) Recommended Test Procedures for Access Floors

COMPOSITE PANEL ASSOCIATION (CPA)

CPA A208.1	(2016) Particleboard
CPA A208.2	(2016) Medium Density Fiberboard (MDF) for Interior Applications

GREEN SEAL (GS)

GS-36	(2013) Adhesives for Commercial Use

ICC EVALUATION SERVICE, INC. (ICC-ES)

ICC-ES AC300	(2014) Acceptance Criteria for Access Floors

INTERNATIONAL CODE COUNCIL (ICC)

ICC IBC	(2021) International Building Code

MASTER PAINTERS INSTITUTE (MPI)

MPI 58	(2012) Stain for Concrete Floors
MPI 99	(2012) Sealer, Water Based, for Concrete Floors
MPI 104	(2012) Sealer, Solvent Based, for Concrete Floors

NATIONAL ELECTRICAL MANUFACTURERS ASSOCIATION (NEMA)

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

NATIONAL FIRE PROTECTION ASSOCIATION (NFPA)

NFPA 75	(2020) Standard for the Protection of Information Technology Equipment
NFPA 99	(2021; TIA 20-1; TIA 21-2) Health Care Facilities Code
NFPA 253	(2011) Standard Method of Test for Critical Radiant Flux of Floor Covering Systems Using a Radiant Heat Energy Source

SOUTH COAST AIR QUALITY MANAGEMENT DISTRICT (SCAQMD)

SCAQMD Rule 1113	(2016) Architectural Coatings
SCAQMD Rule 1168	(2017) Adhesive and Sealant Applications

U.S. DEPARTMENT OF DEFENSE (DOD)

UFC 3-301-01	(2023) Structural Engineering

U.S. GENERAL SERVICES ADMINISTRATION (GSA)

FS TT-C-490	(Rev H; 2021) Chemical Conversion Coatings and Pretreatments for Metallic Substrates (Base for Organic Coatings)

U.S. NATIONAL ARCHIVES AND RECORDS ADMINISTRATION (NARA)

36 CFR 1191	Americans with Disabilities Act (ADA)

Accessibility Guidelines for Buildings and Facilities; Architectural Barriers Act (ABA) Accessibility Guidelines

1.2 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

Detailed Installation Drawings; G[, [_____]]

Fabrication Drawings; G[, [_____]]

SD-03 Product Data

Access Flooring System; G[, [_____]]

Recycled Content For Access Flooring System; S

Indoor Air Quality For Pedestal Adhesive; S

Indoor Air Quality For Concrete Sealer; S

Indoor Air Quality For Adhesives; S

SD-04 Samples

Floor Panels

Floor Covering; G[, [_____]]

Panel Support System

Accessories; G[, [_____]]

Fascia; G[, [_____]]

Exposed Step and Ramp Structure; G[, [_____]]

Railings; G[, [_____]]

Perforated Directional Air Supply Panels; G[, [_____]]

Cut Outs; G[, [_____]]

SD-05 Design Data

Seismic Calculations

SD-06 Test Reports

Factory Tests

Concentrated Load

Uniform Live Load

Rolling Load

Impact Load

Ultimate Load

Pedestal Axial Load

Bonding Strength of Pedestal Adhesive

Electrical Resistance

Field Tests

SD-07 Certificates

Compliance with ICC-ES AC300

Compliance with ICC IBC

Certificate of Compliance

Qualification of Manufacturer

SD-10 Operation and Maintenance Data

Operation and Maintenance Manuals; G[, [_____]]

SD-11 Closeout Submittals

Lifting Device

Warranty; G[, [_____]]

1.3 SPARE PARTS

****
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.
****

[Furnish spare floor panels for each finish including bare panels for carpet tile, complete pedestal assemblies at the rate of one for each 100 or fraction thereof required.][Provide [four] [_____] floor panels complete with specified floor covering for future use.][Provide four spare panels with identical floor covering and pedestals for each 100 square meters 1,000 square feet of access flooring and total of 3 linear meters 10 linear feet of cut-out trim. Store extra stock in same manner and location as project materials.][Provide extra carpet tile from same dye lot consisting of uncut tiles for future maintenance. Provide a minimum of [three][_____] percent of total square meters square yards of each carpet type, pattern, and color. Furnish [[five][____] percent extra of total adhesive tabs][[one][____] percent extra of total components] required for installing carpet tile.]

1.4 QUALITY CONTROL

1.4.1 Qualification of Manufacturer

****
NOTE: Specify 5 years manufacturer experience unless directed otherwise by the Government
****

Access flooring manufacturer must have at least 5 years experience in manufacturing access flooring systems. Certify that the manufacturer of the access flooring system meets requirements specified under paragraph entitled QUALIFICATION OF MANUFACTURER.

1.5 DELIVERY, STORAGE, AND HANDLING

1.5.1 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. Package materials covered by specific references bearing specification number, type and class as applicable.

1.5.2 Storage

Store all materials in original protective packaging in a safe, dry, and clean location. Store panels 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.

1.5.3 Handling

Handle and protect materials in a manner to prevent damage during the entire construction period.

1.6 WARRANTY

****

NOTE: Manufacturers standard warranty is for one year. For government projects, at an additional cost, manufacturers will provide an extended warranty of 5 or more years.

****

Minimum manufacturer warranty must have no dollar limit, cover full system, and must have a minimum duration of [1] [5] [_____] years. Include an agreement to repair or replace floor panels or pedestals that fail within the warranty period in the standard performance guarantee or warranty. Failures include, but are not limited to, sagging and warping of panels; rusting and manufacturers defects of panels or support system.[For [high pressure laminate][conductive high pressure laminate][solid vinyl tile][luxury vinyl tile] provide manufacturer's standard performance guarantees or warranties that extend beyond a one-year period for finish materials.][For [conductive][static-dissipative] vinyl tile provide manufacturer's standard performance guarantees or warranties that extend beyond one year, standard warranty must not be less than a five year wear warranty and ten year conductivity warranty.][For carpet tile provide manufacturer's standard performance guarantees or warranties including a minimum two years for material and workmanship and ten years for wear, static control, tuft bind and delamination.]

PART 2 PRODUCTS

2.1 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.

A stringer is a horizontal framing member that connects the pedestal head, supports the panel edges

and adds lateral stability to the floor system. Stringers should be used on all systems with a height that exceeds 300 mm 12 inches.

Specify the stringer system in seismic zones or when the total area is over 278 square meters 3000 square feet unless the system provides bolted connection between the panel and pedestal. Coordinate with applicable codes and Structural Engineer.

For Air Force facilities, use stringer type floor systems for data processing facilities.

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. Insure that project specific floor loading requirements are fully coordinated with Structural Engineer and applicable codes.

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. Zinc electroplated anti-corrosion coated components must be prohibited in office areas and data centers when the access flooring system is utilized as an air plenum.

****

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

b. Make lateral stability of floor support system 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 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 for the complete access flooring system including, but not limited to the following:

   (1) Compliance with ICC-ES AC300 and Compliance with ICC IBC Acceptance Criteria for Access Floors.

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

   (3) Supporting independent laboratory test reports. For panel panel, stringer and pedestal load test results include concentrated loads

at center of panel, panel edge midpoint, ultimate loads and uniform loads.

(4) Floor electrical characteristics.

(5) Material requirements.

(6) An elevated floor system free of defects in materials, fabrication, finish, and installation, that will remain so for a period of not less than [_____] [1] years after completion.

d. Submit manufacturer's product data for access flooring system consisting of descriptive data, catalog cuts, and installation instructions. Include in the data 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. Include cleaning and maintenance instructions. Systems which contain zinc electroplated anti-corrosion coatings are prohibited.

2.1.1 Design Requirements

****

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

Check manufacturer's literature for maximum loadings available. Generally, by ICC IBC, computer rooms are based on live load of12 kPa 100 psf and point load of 900 kg 2000 lbs. Server rooms may require greater floor loading. Coordinate design loads for access floor with project specific floor loading requirements, structural engineer and design of structural slab.

Project design loads will be in accordance with the International Building Code and UFC 1-200-01.

For most office spaces, underfloor systems rated at 6.9 to 8.6 MPa 1000 to 1250 PSI concentrated load are adequate. For heavier traffic loads at loading docks, elevator entrances, and corridors underfloor systems rated at 10.3 MPa 1500 PSI are appropriate. Underfloor systems rated at 17.2 MPa 2500 PSI are available for heavy equipment.

When editing below paragraphs a., b., c., d. and f. insure that each paragraph is matched up with it's matching option. Options in each paragraph are in matching sequential order.

****

Conduct floor panel testing in accordance with CISCA Access Floors. When tested as specified, make all deflection and deformation measurements 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] [5560] [6670] [8900] [11120] [_____] N [1000] [1250] [1500] [2000] [2500] [_____] pounds on 645 square mm one square inch, at any point on panel, without a top-surface deflection more than 2.54 mm 0.10 inch, and a permanent set not to exceed 0.25 mm 0.01 inch in any of the specified tests. Testing must be in accordance with CISCA Access Floors, Section 1 Concentrated Loads with test panels being supported by understructure to be used with installed system instead of steel support blocks.

b. Uniform live load of [11.97] [14.36] [16.76] [19.15] [23.94] [_____] kPa/square meter [250] [300] [350] [400] [500] [_____] psf, without a top-surface deflection more than 1.5 mm 0.06 inch, and a permanent set not to exceed 0.25 mm 0.01 inch in any of the specified tests, when tested in accordance with CISCA Access Floors, Section 7 Uniform Load Test with test panels being supported by understructure to be used with installed system instead of steel support blocks.

c. A rolling load of [2670] [3560] [4450] [5340] [7110] [_____] N [600] [800] [1000] [1200] [1600] [_____] pounds applied through hard rubber surfaced wheel 152 mm 6 inch diameter by 51 mm 2 inch wide for 10,000 cycles over the same path. Permanent set at conclusion of test must not exceed 1.0 mm 0.040 inch when tested in accordance with CISCA Access Floors, Section 3 Rolling Loads.

d. A rolling load of [3560] [4450] [5560] [6670] [8890] [_____] N [800] [1000] [1250] [1500] [2000] [_____] 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 developing a local overall surface deformation greater than 1 mm 0.04 inch. In accordance with CISCA Access Floors, Section 3 Rolling Loads, the permanent deformation limit under rolling load must be satisfied in all of the specified tests.

e. An impact load of [670] N [150] pounds anywhere on the panel dropped from a height of 914 mm 36 inches onto a 645 square mm 1 square inch area without failure of the system, according to CISCA Access Floors, Section 8 Drop Impact Load Test.

f. Ultimate Load. Panels must meet manufactures published Ultimate Load rating of [6230] [8010] [11120] [12450] [13790] [_____] N [1400] [1800] [2500] [2800] [3100] [_____] pounds when tested in accordance with CISCA Access Floors, Section 2 Ultimate Loading.

g. Safety Factor. Panels must provide a minimum Safety Factor of 5 times the uniform load specified above in accordance with ICC-ES AC300.

h. Recycled Content. Provide Access Flooring System (panels, stringers and pedestals) containing a minimum of [20] [_____] percent recycled content. Provide data identifying percentage of recycled content for access flooring system.

2.1.2 Allowable Tolerances

2.1.2.1 Floor Panel Flatness

Plus or minus 0.89 mm 0.035 inches on diagonal on top of panel or underneath edge.

2.1.2.2 Floor Panel Length

Plus or minus 0.4 mm 0.015 inch.

2.1.2.3 Floor Panel Squareness

Plus or minus 0.5 mm 0.02 inch in panel length.

2.1.3 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 610 mm 24 inches high or higher must be securely anchored to the structural floor in addition to being held in place by adhesive.

Pedestals are normally held in place with an adhesive and must be in full contact with the subfloor surface. Pedestal 610 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, when tested in accordance with CISCA Access Floors, Section 5 Pedestal Axial Load Test.

2.1.4 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][226 Nm 2,000 lbf-in] [_____] when a force is applied to the top of the pedestal in any direction, when tested in accordance with CISCA Access Floors, Section 6 Pedestal Overturning Moment Test. Pedestal adhesive must meet emissions requirement of CDPH SECTION 01350 (use the office or classroom requirements, regardless of space type). Provide validation of indoor air quality for pedestal adhesive.

2.1.5 Bond Strength of Factory Installed Covering

****

NOTE: Coordinate test load weights with those specified for floor panel testing in General System

Requirements.
****

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 [3560] [4450] [5560] [6670] [8890] [_____] N [800] [1000] [1250] [1500] [2000] [_____] pounds, without separation of the covering from the panel.

2.1.6 Seismic Calculations

2.1.6.1 Navy Project Specific 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 UFC 1-200-01.

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 3-301-01 and Section 13 48 73 SEISMIC CONTROL FOR MISCELLANEOUS EQUIPMENT must be included in the contract documents.
****

Submit seismic calculations for lateral bracing, sealed by a Professional Engineer. Document that access flooring system complies with seismic requirements of ICC IBC and ASCE 7-16 for Occupancy Importance Factor (Ip) of [1.0] [1.5], and seismic horizontal force (Fp) determined in accordance with UFC 3-301-01 and Section 1615 of the ICC IBC and ASCE 7-16, Minimum Design Loads for buildings and other structures.

2.1.6.2 Army Project Specific 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 3-301-01 and Section 13 48 73 SEISMIC CONTROL FOR MISCELLANEOUS EQUIPMENT must be included in the contract documents.
****

Submit seismic calculations for special bracing to resist the effects of seismic or other forces [in accordance with UFC 3-301-01, ICC IBC and ASCE 7-16] [as shown on the approved detailed installation drawings]. Submit 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.

2.2 FLOOR PANELS

2.2.1 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, 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.

e. Floor-panel joint-width tolerances must not exceed 0.43 mm 0.017 inch as measured with a feeler gage at any point in any joint when the panels are installed and as long as the air leakage requirements specified in this section are met.

f. Submit [three][_____] complete samples of floor panels.

2.2.2 Detailed Installation Drawings

Submit Detailed Installation Drawings that as a minimum indicate the following:

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. Details at floor perimeter and height above structural floor

f. Method of anchorage to structural subfloor

g. Lateral bracing

h. Typical cutout details

i. Gasketing, return air grilles, supply air registers, and perforated panels. Include air transfer capacity of grilles, registers and panels

j. Description of [shop] [factory] coating

k. Floor finishes

l. Location of connection to building grounding electrode

2.2.3 Panel Construction

****

NOTE: There are five basic floor panel types: aluminum, hollow formed steel, cementitious-filled formed steel, metal-clad wood core, and concrete. The most commonly used floor panel is the Cementitious-Filled Formed Steel (Composite Panels). Nonferrous materials should be used in areas where there is potential for damage by rust oxides or paint flakes.

Editing of a Non-Proprietary Specification: Note that there are two primary Buy America FAR compliant access flooring system suppliers to the North American market who respectively manufacture the Cementitious-Filled Formed Steel and Lightweight Concrete Filled Panels. Both panel types should be selected to insure non-proprietary specifications.

The standard panel size of 600 by 600 mm 24 by 24 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. SPAWARS may be involved in Air Force and Army projects, verify and coordinate requirements with User.

****

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 underside of panel. 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. Permanently mark panels to indicate load rating and model number.

d. Machine square floor panels to within plus or minus 0.38 mm 0.015 inch with edge straightness plus or minus 0.064 mm 0.0025 inch. If plastic edging is applied to the panel, the tolerances apply to the panel before the plastic edging is applied.

****
NOTE: For security or additional structural stability of the access flooring system, panels can be bolted to pedestals. However this will cause additional maintenance concerns and will need to be coordinated with the desired floor covering.
****

[e. Provide panels with holes drilled in corners to align precisely with threaded holes in pedestal heads and to accept countersunk corrosion resistant screws with heads that are flush with top of panel.]

[2.2.3.1 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.
****

Provide aluminum panels of die-cast or extruded construction conforming to ASTM B85/B85M.

][2.2.3.2 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.

][2.2.3.3 Cementitious-Filled Formed Steel (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.

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 use of composite panel.

****

Provide composite panels 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.

][2.2.3.4 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 option.

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.

****

Provide wood core panels with cores of wood particleboard conforming to CPA A208.1, Grade 1-M-3, or of plywood conforming to CPA A208.2, APA E30, and APA L870, EXT-DFPA-C-C. The core must be not less than 25 mm 1 inch thick, and be faced on all 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 E84. 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, smoke developed and Class A fire rating requirements.

][2.2.3.5 Lightweight Concrete Filled Panels (Exposed Concrete)

****

NOTE: Lightweight concrete filled panels are either solid or metal clad. They perform well under

dynamic loadings with little deformation and their weight is approximately 195 kg/m^2 10 psf. They are primarily used in office flooring and are similar in cost to cementitious fill panels.

****

Provide lightweight concrete of lightweight structural concrete with either structural reinforcing or a die-formed, hot dipped 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. Concrete sealer must meet either emissions requirements of CDPH SECTION 01350 (use the office or classroom requirements, regardless of space type) or VOC content requirements of SCAQMD Rule 1113. Provide validation of indoor air quality for concrete sealer.

]2.2.4 Floor Covering

****

NOTE: Verify with User and manufacturers which finishes are recommended for what type of functional space, type of panel and understructure. Delete finish paragraphs that are not applicable to the project.

Clearly indicate in contract documents where different floor covering types are located if more than one type is specified for a project.

Verify that finishes being considered are approved for use by the access flooring manufacturer. Some finishes may be considered standard by some manufacturers and non-standard by others which could add cost to the project. The finishes need to be of a size that is appropriate for a one-to-one installation to the floor panel with no seams, size needs to be slightly smaller than a standard 610 by 610 mm 24 inch by 24 inch. Coordinate size with access flooring manufacturer. Note that not all manufacturer floor tile products are available in the required size and may require additional cuts, this may add cost to the project and add product waste.

Consider the desired aesthetics, appearance and use of a facility and the following edge detail information to determine the type of floor covering edge detail preferred for a project:

a. Cementitious Filled Formed Steel (Composite) and Lightweight Concrete Filled (Exposed Concrete) Panels with factory applied high pressure laminate or resilient flooring material - The integral finish edge detail is available from more manufacturers than the applied trim piece edge detail. If the applied trim piece detail is acceptable for a project, recommend that both types remain in the specification to open it up to more manufacturers so the specification does not become proprietary with only the applied trim piece. The integral finish

detail is more durable than the applied trim piece which can become damaged.

b. Metal-Clad Wood Core Panels with factory applied high pressure laminate material- Edge detail is available both integral to the finish material and as an applied trim piece dependent upon the manufacturer. Recommend that both types remain in the specification to open it up to more manufacturers so the specification does not become proprietary.

c. Metal-Clad Wood Core Panels with factory applied resilient flooring material- Edge detail with applied trim piece is more typical.

d. Steel and Aluminum Panels - Edge detail is available both integral to the finish material and as an applied trim piece dependant upon the manufacturer. Recommend that both types remain in the specification to open it up to more manufacturers so the specification does not become proprietary.

Verify that finish being considered is appropriate for the system specified when raised access floor panels are required to be screwed into place. Panels that are screwed into place and have a factory finish that is bonded into place will have an exposed screwhead in each corner. The screwhead for resilient floor materials will be flush with panel face and not finish face and may require additional maintenance to clean out screwhead locations. If it is determined that a panel with factory applied finish will be screwed into place verify with User if a requirement for finish plugs be added to the specification to provide a more finished appearance and coordinate availability with the manufacturer. These plugs would be the same material as the panel finish and would be installed to cover the exposed screwhead. Plugs are not permanent, can come out and become lost. Plug should be installed per manufacturer recommendations for easy removal and replacement for User to access underfloor area.

Choice of critical radiant flux level as it applies to building type and area of application will be made in accordance with UFC 3-600-01, UFC 1-200-01 and NFPA 101. Wherever the use of Class II (0.22) watts finish is required, Class I (0.45) watts will be permitted.

Aluminum panels often do not receive an applied finish. If it is determined a finish is required, add edge detail requirement to applicable finish paragraph inside empty brackets.

Verify with manufacturer if embossed texture being specified is acceptable for use with the lifting device.

****

Surface floor panels with [factory applied finish materials firmly bonded in place with waterproof adhesive][carpet tile installed in the field]. Provide finish flooring materials in corridors and exits with a critical radiant flux of not less than [0.45 watts per square centimeter (Class 1)] [0.22 watts per square centimeter (Class 2)] when tested in accordance with ASTM E648 or NFPA 253. 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, not surface applied. Bolt heads or similar attachments must not rise above the traffic surface. Submit [three] [_____] separate samples of each specified floor covering finish and color.

[2.2.4.1 High Pressure Laminate

****
NOTE: HDM, 2 mm 1/16 inch thick high pressure laminate is typically used. HDH, 3.2 mm 1/8 inch thickness is also available, but is more expensive than the HDM.
****

Provide factory applied high pressure laminate surfacing conforming to ANSI/NEMA LD 3, High-Wear type, Grade [HDM, 2 mm 1/16 inch thickness][_____].Finish material must consist of one piece to cover the face of the panel. Provide edge detail that is [integral to the finish material][or][is an applied trim piece that finishes the edges of the panel, is flush with floor finish, and is [PVC][or][ABS][_____]]. The total system electrical resistance from the wearing surface of the floor to the ground connection must be between 1,000,000 (1.0×10^6) ohms and 20,000,000,000 ohms (2.0×10^{10}).

][2.2.4.2 Conductive High Pressure Laminate

****
NOTE: HDM, 2 mm 1/16 inch thick conductive high pressure laminate is typically used. HDH, 3.2 mm 1/8 inch thickness is also available, but is more expensive than the HDM.
****

Provide factory applied high pressure laminate surfacing conforming to ANSI/NEMA LD 3, High-Wear type, Grade [HDM, 2 mm 1/16 inch thickness][_____]. Finish material must consist of one piece to cover the face of the panel. Provide edge detail that is [integral to the finish material][or][is an applied trim piece that finishes the edges of the panel, is flush with floor finish, and is [PVC][or][ABS][_____]].The total system electrical resistance from the wearing surface of the floor to the ground connection must be between 25,000 ohms (2.5×10^4) and 1,000,000 ohms (1.0×10^6).

][2.2.4.3 Solid Vinyl Tile

Provide factory applied conductive vinyl tile that is a homogeneous vinyl product and conforms to ASTM F1700, Class I monolithic (minimum wear layer thickness 3 mm 0.125 inch and minimum overall thickness 3 mm 0.125 inch), Type A smooth surface. Finish material must consist of one piece to cover

the face of the panel. Provide edge detail that is [integral to the finish material][or][is an applied trim piece that finishes the edges of the panel, is flush with floor finish, and is [PVC][or][ABS][_____]].

][2.2.4.4 Luxury Vinyl Tile

Provide factory applied luxury vinyl tile conforming to Class III printed film minimum wear layer thickness of 0.50 mm 0.020 inch and minimum overall thickness 3 mm 0.125 inch, Type [A (smooth)] [B (embossed)]. Finish material must consist of one piece to cover the face of the panel. Provide edge detail that is [integral to the finish material][or][is an applied trim piece that finishes the edges of the panel, is flush with floor finish, and is [PVC][or][ABS][_____]].

][2.2.4.5 Conductive Vinyl Tile

Provide factory applied conductive vinyl tile that is a homogeneous vinyl product and conforms to ASTM F1700, Class I monolithic, Type A smooth surface. Provide electrical resistance from surface to surface and surface to ground between 25,000 ohms (2.5×10^4) and 1,000,000 ohms (1.0×10^6) when tested in accordance with ASTM F150. Material must consist of one piece to cover the face of the panel. Provide edge detail that is [integral to the finish material][or][is an applied trim piece that finishes the edges of the panel, is flush with floor finish, and is [PVC][or][ABS][_____]].

][2.2.4.6 Static-Dissipative Vinyl Tile

Provide factory applied static-dissipative vinyl tile that is a homogeneous vinyl product and conforms to ASTM F1700, Class I monolithic, Type A smooth surface. Provide electrical resistance from surface to surface and surface to ground between 1,000,000 ohms (1.0×10^6) and 1,000,000,000 ohms (1.0×10^9) when tested in accordance with ASTM F150. Material must consist of one piece to cover the face of the panel. Provide edge detail that is [integral to the finish material][or][is an applied trim piece that finishes the edges of the panel, is flush with floor finish, and is [PVC][or][ABS][_____]].

][2.2.4.7 Carpet Tile

****

NOTE: Consider the function of the room, User requirements and consult with the project electrical engineer when determining the type of carpet that is appropriate, 09 68 00 CARPETING or 09 62 38 STATIC-CONTROL FLOORING (for static-control carpet tile).

Be aware that full spread releasable if not installed in accordance with manufacturer required drying time can become overly tacky making it difficult to remove from screwheads and between panels and to lift carpet tile from panel.

Coordinate carpet tile selection for one to one alignment with floor panels with the access flooring manufacturers. Due to the size required (slightly smaller than 610 by 610 mm 24 inch by 24 inch) the

access flooring manufacturers have a variety of standard carpets available from different carpet manufacturers.

Recommend listing at least two manufacturers for one to one alignment so specification does not become proprietary.

Installation method for one to one alignment with floor panels is limited to monolithic and quarter turn installation patterns.

Do not use the odor-free adhesive tab system or full spread releasable adhesive to achieve a one to one alignment with floor panels. This is not recommended by manufacturers.

****

Reference Section [09 68 00 CARPETING][and][09 62 38 STATIC-CONTROL FLOORING (static-control carpet tile)] for carpet tile specification requirements including recycled content, volitale organic compound (VOC) limits and additional flammability testing requirements for carpet tile. Carpet tile must be field installed and comply with the following:

a. Installation method on level surfaces must allow carpet tile to be easily removed and replaced in the field and must be installed in accordance with manufacturer's recommended installation instructions.

b. Install carpet tile in a [monolithic][1/4 turn][ashlar][brick][random][____] pattern.

[c. Install carpet tile on secure and level surfaces offset from the access floor grid with a [manufacturer approved odor-free adhesive tab system][or][with full spread releasable adhesive using manufacturer recommended adhesives. Comply with manufacturer installation instructions for required drying time so the adhesive sets up properly].]

[d. Install carpet tile on secure and level surfaces with the access flooring manufacturer's recommended installation method and components for a one to one alignment with floor panels (one carpet tile to one floor panel); equal to Tate PosiTile[, _____] or Haworth CarpetLok. This installation method requires the removal of only one carpet tile to access one raised access panel. Carpet tile size for a one-to-one installation must be slightly smaller than a standard 610 by 610 mm 24 inch by 24 inch tile, coordinate required size with the raised access flooring manufacturer. Factory applied carpet tile with perimeter edge strip and field applied one to one carpet tile installation over raised access floor panels with permanent or releasable adhesive are not acceptable installation methods.]

[e. Carpet tile on access flooring stairs and sloped surfaces must be installed with a more permanent installation method in accordance with manufacturer's instructions and with manufacturer recommended adhesives for these types of locations.]

][2.2.4.8 Lightweight Concrete Filled (Exposed Concrete)

****

NOTE: Bare panels may be specified to achieve a desired visual aesthetic. Finish panels with sealer to prevent dusting and to minimize water absorption. User should be made aware that sealer will need to be reapplied over time.

****

Provide lightweight concrete filled panel with a [MPI 58 concrete stain][and][[MPI 104 concrete floor sealer][or][MPI 99 water based concrete floor sealer]]. Apply coatings in accordance with manufacturer's instructions.

]2.2.5 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

****

Provide the manufacturer's standard registers, grilles, perforated panels, and plenum dividers type where indicated. Provide registers, grilles, and perforated panels designed to support the same static loads as floor panels without structural failure, and capable of delivering the air volumes indicated. Registers and perforated panels must be 25 percent open area and equipped with adjustable dampers. Submit [three][_____] samples and colors of each accessory.

2.2.6 Resilient Base

Conform to ASTM F1861, [[Type TS (vulcanized thermoset rubber)] [or] [Type TP (thermoplastic rubber)]] [, or] [Type TV (thermoplastic vinyl)], [Style A (straight - installed with carpet)] [and] [Style B (coved - installed with resilient flooring)]. Provide [100] [150] mm [4] [6] inch high and a minimum 3.175 mm 1/8 inch thick wall base. Provide [preformed] [job formed] corners in matching height, shape, and color.

2.2.7 Adhesives

Provide adhesives as recommended by the manufacturer. Provide non-aerosol adhesive products that meet either emissions requirements of CDPH SECTION 01350 (use the requirements for either office or classroom, regardless of space type) or VOC content requirements of SCAQMD Rule 1168. Provide aerosol adhesives that meet either emissions requirements of CDPH SECTION 01350 (use the requirements for office or classroom, regardless of space type) or VOC content requirements of GS-36. Provide validation of indoor air quality for adhesives.[Provide conductive adhesive as recommended by the manufacturer of the static-control flooring.][Provide conductive releasable adhesive as recommended by the manufacturer for static-control carpet tile.]

2.2.8 Lifting Device

At turnover provide one floor panel lifting device standard with the floor manufacturer, for each individual floor area (room or corridor). Furnish a minimum of two devices.[For AIR FORCE projects, at turnover, provide a total of two suction-type floor panel lifting devices for each floor area (room or corridor).]

2.3 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. Submit one sample of suspension system proposed for use.

2.3.1 Pedestals

Provide pedestals made of steel or aluminum or a combination thereof. Ferrous materials must have a factory-applied corrosion-resistant finish. Provide pedestal base plates with a minimum of 10,300 square mm 16 square inches of bearing surface and a minimum of 3 mm 1/8 inch thickness. 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. Provide locking devices to positively lock the final pedestal vertical adjustments in place. Pedestal caps must interlock with panels to preclude tilting or rocking of the panels.

[2.3.2 Gaskets

****

NOTE: For stringerless systems, gasketing is not available for all panel types. Verify availability of gaskets for the panel types specified.

****

Provide continuous gasketing at contact surfaces between panel to deaden sound and seal off the underfloor cavity from above for air tightness, and to maintain panel alignment.

]2.4 FASCIA

Provide aluminum or steel fascia plates 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 standard with the floor system manufacturer. Fascia plates must be reinforced on the back, and supported using the manufacturer's standard lateral bracing at maximum 1200 mm 4 feet on center. Provide trim, angles, and fasteners as required. Submit [three][_____] color samples for fascia.

2.5 STEPS AND RAMPS

****

NOTE: Coordinate step and ramp finish with finishes specified in FLOOR COVERINGS and insert selected finish. Resilient flooring is recommended if there will be a lot of cart traffic. Carpet tile should be installed with a permanent adhesive.

****

Securely fasten steps and ramps to the access flooring system and to the structural floor. Include in the construction standard floor system components and custom components as required, and 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. Submit [three][_____] color samples for exposed step and ramp structure.

2.5.1 Steps

Height of risers must comply with applicable codes. Design steps to support a uniform load of 7.18 kPa 150 psf. Surface treads with the manufacturer's standard non-slip floor finish. Floor covering must be [____].

2.5.2 Ramps

Slope of ramps must comply with applicable codes and 36 CFR 1191 Americans with Disabilities Act (ADA). Design ramps to support the same loads as specified for floor panels. Surface ramps with the manufacturer's standard non-slip floor finish. Floor covering must be [____].

2.6 RAILINGS

****

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

****

Provide railings compliant with applicable codes and 36 CFR 1191 Americans with Disabilities Act (ADA). As a minimum railings must be of 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, make the top rail a minimum of 900 mm 36 inches high and parallel to the incline. Make the top rail 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 m 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.] Submit [three][_____] color samples for railings.

2.7 FACTORY TESTS

Factory test access flooring, using 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.

2.7.1 Load Tests

Conduct floor panel and pedestal testing in accordance with CISCA Access Floors to determine deformation and permanent set of panels and sytem due to concentrated, Uniform, rolling, impact and ultimate loading when panels are supported by actual understructure.

2.7.2 Bond Strength of Covering

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NOTE: Coordinate test load weights with those specified for floor panel testing in General System Requirements.

Delete this test when field applied carpet tile is specified.
****

Conduct test for bond strength of covering in accordance with CISCA Access Floors for rolling loads, except as specified. Panels must be tested with specified hard surface flooring and on the pedestals and stringers as specified for the installed floor. Brace the supports as necessary to prevent sideways movement during the test. Impose a test load of [3560] [4450] [5560] [6670] [8890] [_____] N [800] [1000] [1250] [1500] [2000] [_____] pounds on the test assembly through a 75 mm 3 inches in diameter and 25 mm 1 inch wide hard plastic caster. Roll the caster completely across the center of the panel. The panel must withstand 20 passes of the caster with no delamination or separation of the covering.

[2.8 REGISTERS AND GRILLES

****
NOTE: Size of registers should be stated if applicable. Coordinate with Mechanical Engineer.
****

Registers and grilles must be [_____] mm inches by [_____] mm inches long with a minimum free area of [_____] square mm inches, made from 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

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

][2.10 PERFORATED DIRECTIONAL AIR SUPPLY PANELS

Provide directional air supply floor panels that meet or exceed the design criteria specified for standard panels, are fabricated of [light weight die cast aluminum with powder coat finish] [welded steel vanes with powder coat finish] [perforated steel sheet welded to a formed steel pan with powder coat finish]. Submit [three][_____] color samples for perforated directional air supply panels

][2.11 CUT OUTS

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. Submit [three][_____] color samples for cut outs.

a. 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 meter 1000 square

feet for future use.

b. Openings larger than 100 mm 4 inches wide must use rigid polyvinylchloride or molded polypropylene edging. Perform cutting of panels, including cutouts, outside of the building.

c. When size of cutout reduces the performance requirement of panel, provide intermediate pedestals adjacent to cutouts.

][2.12 EDGE CLOSURE

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.

]2.13 COLOR

****

NOTE: Editing of color reference sentence(s) must be coordinated with the Government. Generally UFGS 09 06 00 SCHEDULES FOR FINISHES or as indicated is used when the project is designed by an Architect or Interior designer. Color should be selected from manufacturer's standard colors or identified as a manufacturer's color in this specification only when the project is very simple and has minimal finishes.

When the Government directs that color be located as indicated, a note must be added to the drawings 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 that 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 referenced, be certain that the product conforms to this specification, as edited.

****

Color must be [in accordance with Section 09 06 00 SCHEDULES FOR FINISHES] [as indicated] [_____]. Color listed is not intended to limit the selection of equal colors from other manufacturers.

PART 3 EXECUTION

3.1 INSTALLATION

Install access flooring at the location and elevation and in the arrangement shown on the approved detailed installation 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 access flooring systems.

Install the floor system in accordance with the manufacturer's instructions. Open ends of the floor, where the floor system does not abut wall or other construction, must have positive anchorage and rigid support. Maintain areas to receive access flooring 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 30 00 CAST-IN-PLACE CONCRETE should require that concrete floors used as air plenum surfaces beneath raised floors be sealed with approved 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.

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Clear out all debris in the area in which the floor system is to be installed. Thoroughly clean structural floor surfaces and remove all dust. Install floor coatings, required for dust or vapor control, prior to installation of pedestals, only if the pedestal adhesive will not damage the coating. If the coating and adhesive are not compatible, apply the coating after the pedestals have been installed and the adhesive has cured.

3.1.2 Pedestals

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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 will be used.

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Pedestals must be accurately spaced, and set plumb and in true alignment. Set base plates in full and firm contact with the structural floor, and secured to the structural floor with adhesive or steel expansion anchors in accordance with manufacturer's instructions.

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. Use

special framing for additional lateral support as shown on the approved detailed installation 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. Fasten perimeter panels, cutout panels, and panels adjoining columns, stairs, and ramps to the supporting components to form a rigid boundary for the interior panels. Level floors within the specified tolerances. Cut edges of [steel and wood-core panels must be [painted] [finished] [_____] as recommended by the panel manufacturer.] [Exposed edges of composite panels must be coated with a silicone rubber sealant or with an adhesive recommended by the panel manufacturer.] Secure extruded vinyl edging 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, close cutouts for conduit and similar penetrations using self-extinguishing sponge rubber or air sealing grommets.]

3.1.5 Carpet Tile

Reference carpet tile paragraph in FLOOR COVERING for carpet tile installation requirements.

3.1.6 Resilient Base

Provide base at vertical wall intersections as indicated in the [drawings][_____]. Apply the base after the floor system has been completely installed. Install wall base in accordance with manufacturer's printed installation instructions. Prepare and apply adhesives in accordance with manufacturer's printed directions. Tighten base joints and make even with adjacent flooring. Fill voids along the top edge of base at masonry walls with caulk. Roll entire vertical surface of base with hand roller, and press toe of base with a straight piece of wood to ensure proper alignment. Avoid excess adhesive in corners.

3.1.7 Fascia Plates

Cover exposed floor ends and exposed openings of ramps and stairs with [aluminum] [steel closures] [finish material as indicated].

3.1.8 Repair of Zinc Coating

Repair zinc coating that has been damaged, and cut edges of zinc-coated components and accessories, by the application of a galvanizing repair paint conforming to ASTM A780/A780M. Areas to be repaired must be thoroughly cleaned prior to application of the paint.

3.2 FIELD TESTS

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

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

3.2.2 Air Leakage

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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. Coordinate with Mechanical Engineer for anticipated positive pressure in the plenum.

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When the space below the finished floor is 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 [.05 inches h2o (Pa)][0.1 inches h2o (Pa)], water gauge, positive pressure in the plenum, when tested in accordance with CISCA Access Floors, Section 10 Air Leakage Test. Measure the leakage rate on the finished raised floor system, which may include carpet.

3.2.3 Grounding

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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.

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Ground the access flooring system 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].

3.2.3.1 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.

3.2.3.2 Joint Resistance

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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.

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Electrical joint resistance between individual stringer and pedestal junctions must be less than 0.1 milliohms. Electrical resistance between stringers and floor panels, as mounted in normal use, must be less than 3 ohms when tested in accordance with ASTM F150.

3.2.4 Electrical Resistance

Conduct testing of electrical resistance, in the completed installation, in the presence of the Contracting Officer 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. Take measurements 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 set at 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. Measure electrical resistance 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.

[3.2.5 SEISMIC SPECIAL INSPECTION AND TESTING

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NOTE: Include this paragraph only when special inspection and testing for seismic-resisting systems is required by Appendix 11A of ASCE 7-16.

This paragraph will be applicable to both new buildings designed according to UFC 3-301-01 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 3-301-01 and Appendix 11A of ASCE 7-16. This includes indicating the locations of all structural components and connections requiring inspection.

Add any additional requirements as necessary.
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Perform special inspections and testing for seismic-resisting systems and components in accordance with UFC 3-301-01 and Section 01 45 35 SPECIAL INSPECTIONS.

]3.3 CLEANING AND PROTECTION

3.3.1 Cleaning

Keep the space below the completed floor 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

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

[3.4 FIRE SAFETY

Install an automatic detection system below the raised floor meeting the requirements of NFPA 75 paragraph 5-2.1 to 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 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 --