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USACE / NAVFAC / AFCEA / NASA UFGS-09 65 66 (April 2006)  
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Preparing Activity: USACE Replacing without change  
UFGS-09620 (August 2004)

## UNIFIED FACILITIES GUIDE SPECIFICATIONS

References are in agreement with UMRL dated January 2009

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04/06

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### SECTION 09 65 66

#### RESILIENT ATHLETIC FLOORING 04/06

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NOTE: This guide specification covers the requirements for resilient athletic flooring.

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

Remove information and requirements not required in 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).

This guide specification includes tailoring options for indoor-outdoor carpeting, rubber composition tile, rubber poured-in-place flooring, sheet rubber composition flooring, sheet vinyl composition flooring, urethane poured-in-place flooring, and resilient mat underlay. Selection or deselection of a tailoring option will include or exclude that option in the section, but editing the resulting section to fit the project is still required.

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## PART 1 GENERAL

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NOTE: Systems specified in this guide specification are recommended for indoor athletic rooms e.g., weight rooms, running tracks, recreational areas, aerobic centers, multi-purpose gym floors, etc. Hardwood flooring is preferable for basketball

courts, handball, and racquetball courts.  
Rubber-base floorings can be used in outdoor  
installations like wet bars, running tracks, tennis  
courts, and swimming pool walks.

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## 1.1 REFERENCES

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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.

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

### ASTM INTERNATIONAL (ASTM)

ASTM C 920	(2008) Standard Specification for Elastomeric Joint Sealants
ASTM D 1054	(2002; R 2007) Rubber Property - Resilience Using a Rebound Pendulum
ASTM D 1242	(1995a) Resistance of Plastic Materials to Abrasion
ASTM D 1894	(2008) Static and Kinetic Coefficients of Friction of Plastic Film and Sheeting
ASTM D 2240	(2005) Standard Test Method for Rubber Property - Durometer Hardness
ASTM D 2632	(2001) Rubber Property-Resilience by Vertical Rebound
ASTM D 395	(2003; R 2008) Standard Test Methods for Rubber Property - Compression Set
ASTM D 412	(2006ae1e2) Standard Test Methods for Vulcanized Rubber and Thermoplastic Elastomers - Tension

ASTM D 624	(2000; R 2007) Tear Strength of Conventional Vulcanized Rubber and Thermoplastic Elastomers
ASTM F 1303	(2004) Sheet Vinyl Floor Covering with Backing
ASTM G 21	(1996; R 2002) Determining Resistance of Synthetic Polymeric Materials to Fungi

## 1.2 SUBMITTALS

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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.

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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.] The following shall be submitted in accordance with Section 01 33 00 SUBMITTAL PROCEDURES:

### SD-02 Shop Drawings

Approved Detail Drawings[; G][; G, [\_\_\_\_]]

Drawings showing game lines, location of anchor plate

assemblies, floor outlets, and under-floor conduit or raceways.

#### SD-03 Product Data

##### Installation

Manufacturer's descriptive data and catalog cuts indicating materials of construction and physical characteristics. Installation, cleaning and maintenance instructions shall be included.

#### SD-04 Samples

##### Flooring

Three samples minimum 225 x 275 mm 9 x 11 inches of each color of flooring material required.

#### SD-07 Certificates

##### Materials

Manufacturer's certificates stating that the resilient athletic flooring materials conform to the specified requirements. Labels or markings affixed to manufacturer's products attesting that products meet requirements specified herein will be accepted in lieu of certificates.

### 1.3 QUALIFICATIONS

Adhesive applied and poured-in-place flooring shall be installed by an experienced floor applicator approved by the manufacturer.

### 1.4 DELIVERY, STORAGE, AND HANDLING

Materials shall be delivered in manufacturer's original unopened containers with labels intact. Materials shall not be delivered to the installation area or installed before all work that may damage the materials or the finished floor, such as overhead work, is completed. Materials shall be stored in a clean, dry area. Materials in storage shall be maintained at temperatures recommended by the manufacturer. Protection boards shall be stored flat and off the ground.

### 1.5 WARRANTY

Manufacturer's standard performance guarantees or warranties that extend beyond a one year period shall be provided.

### 1.6 EXTRA MATERIALS

#### 1.6.1 Floor Tiles

Spare tiles of each color shall be furnished at the rate of [\_\_\_\_\_] [5] tiles for each 1000 tiles installed. Tiles shall be from the same lot as those installed.

#### 1.6.2 Carpeting

Extra material from same dye lot consisting of full width continuous

broadloom shall be provided for maintenance. A minimum of [\_\_\_\_\_] percent of total square meters square yards of each carpet type, pattern, and color shall be provided.

## PART 2 PRODUCTS

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NOTE: If more than one type of resilient flooring is required, a separate paragraph for that type floor will be used. Each flooring type will be designated with a letter or number symbol. Use the same symbols to key flooring types to locations listed or shown on the drawings.

Floor types will be specified for a specific use such as, carpet for pool areas, multi-use areas, and pro shops, or rubber tile flooring for weight rooms, etc. Edit specification as required to meet project needs and omit text not applicable.

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### 2.1 INDOOR-OUTDOOR CARPETING TYPE [A] [\_\_\_\_\_]

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NOTE: Carpeting shall be specially designed for indoor or indoor-outdoor environments as required, e.g., weight rooms, outdoor playground areas, indoor/outdoor pool areas, and pro shops. Edit as required to meet project requirements.

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Carpet-type flooring shall be spike proof [[ribbed] [berber] pattern consisting of a top layer of rugged [polypropylene] [or] [nylon] fibers combined with an inorganic cut-resistant [non-skid] [\_\_\_\_\_]] [wet areas artificial turf pattern consisting of a top layer of rugged polypropylene fibers combined with an inorganic cut-resistant [porous rubber knob] [foam] [\_\_\_\_\_]] backing. Minimum total thickness shall be [10] [\_\_\_\_\_] mm [0.375] [\_\_\_\_\_] inches. Finished surface pile yarn weight (face weight) shall be minimum [\_\_\_\_\_] kg/square meter ounces/square yard. Test results for resistance to soil bacteria or fungi shall show no sustained growth or discoloration after 21 days when tested in accordance with ASTM G 21.

### 2.2 RUBBER COMPOSITION TILE TYPE [A] [\_\_\_\_\_]

Rubber tiles shall be [interlocked] [\_\_\_\_\_] ([600 x 600] [\_\_\_\_\_] mm ([24 x 24] [\_\_\_\_\_] inches square, of solid first quality rubber, uniformly resilient material designed to be applied [with] [without] adhesive. Tiles shall be approximately [13] [\_\_\_\_\_] mm [1/2] [\_\_\_\_\_] inch thick, shall be [smooth] [traction] [\_\_\_\_\_] texture, and shall be [reversible] [non-reversible]. Flooring shall be able to withstand [75 percent compression for 22 hours at 70 degrees C 158 degrees F] [\_\_\_\_\_] without residual deformation when tested in accordance with ASTM D 395. Flooring shall have a durometer hardness Shore-A of 50-60 when tested in accordance with ASTM D 2240.

### 2.3 RUBBER POURED-IN-PLACE FLOORING TYPE [A] [\_\_\_\_\_]

The resilient poured-in-place rubber surface shall be composed of chloroprene rubber, chloroprene rubber sponge, aggregate, setting powders,

and a top finish composed of acrylic resins. Flooring shall be able to withstand 50 percent compression for 72 hours at 22 degrees C 72 degrees F with a residual deformation of less than 10 percent when tested in accordance with ASTM D 395. Flooring shall have a minimum compression modulus at 10 percent of 690 kPa 100 psi, a minimum elongation of 250 percent and a minimum tensile strength of 3800 kPa 550 psi plus or minus 34 kPa 5 psi when tested in accordance with ASTM D 412. Flooring shall have a durometer hardness Shore-A of 55-60 when tested in accordance with ASTM D 2240 and a minimum tear resistance of 10.5 kN/m 60 lbf/inch when tested in accordance with ASTM D 624.

#### 2.4 SHEET RUBBER COMPOSITION FLOORING TYPE [A] [\_\_\_\_\_]

Sheet rubber flooring shall be prefabricated, homogeneous, natural and synthetic rubbers, and shall be minimum [5] [\_\_\_\_\_] mm [3/16] [\_\_\_\_\_] inch thick, and shall have [smooth gymnasium] [textured all-purpose] finish. Flooring shall be roll type not less than 1500 [\_\_\_\_\_] mm 60 [\_\_\_\_\_] inches wide. Flooring shall have a minimum tensile stress at 100 percent elongation of 1500 kPa 220 psi and a minimum ultimate elongation of 250 percent when tested in accordance with ASTM D 412. Flooring shall be able to withstand 50 percent compression for 72 hours at 22 degrees C 72 degrees F with a residual deformation of less than 10 percent when tested in accordance with ASTM D 395. Flooring shall provide a 55 plus or minus 5 percent rebound when tested in accordance with ASTM D 1054.

#### 2.5 SHEET VINYL COMPOSITION FLOORING TYPE [A] [\_\_\_\_\_]

Sheet vinyl flooring shall consist of a solid polyvinyl chloride material which shall conform to the chemical resistance requirements of ASTM F 1303. Flooring shall be not less than 1200 mm 48 inches wide and shall have a minimum thickness of [3] [\_\_\_\_\_] mm [1/8] [\_\_\_\_\_] inch. Floor surface shall be [smooth] [stipple] [track embossed] texture. Flooring shall have a minimum coefficient of friction of 0.75 when tested in accordance with ASTM D 1894. Flooring shall have an average thickness loss of 0.2 mm 8.0 mils plus or minus 0.025 mm 1 mil when tested in accordance with ASTM D 1242. Rebound resilience of flooring shall be greater than 12 percent and less than 30 percent when tested in accordance with ASTM D 2632. [An optional compatible top coating shall be provided by the sheet vinyl flooring manufacturer.]

#### 2.6 URETHANE POURED-IN-PLACE FLOORING TYPE [A] [\_\_\_\_\_]

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NOTE: Urethane resilient flooring may be installed  
on a variety of substrates and in a variety of  
thicknesses from 3 to 25 mm (1/8 to 1 inch).  
Coordinate with manufacturer's literature. Edit  
specification as required.  
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The resilient poured-in-place urethane surface shall be composed of a seamless pigmented monolithic material. Flooring shall be minimum [3] [\_\_\_\_\_] mm [1/8] [\_\_\_\_\_] inch thick and shall have [smooth gymnasium] [textured all-purpose] [textured track] finish. Flooring shall have a durometer hardness Shore-A of 55-60 when tested in accordance with ASTM D 2240. Flooring shall have a minimum ultimate elongation of 250 percent when tested in accordance with ASTM D 412 and shall have a density of 1.25.



## 2.7 RESILIENT MAT UNDERLAY

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NOTE: Resilient mat underlay may be used under a two-component polyurethane wear coat system, sheet rubber surfacing system, or a vinyl sheet surfacing system. Deletion or specification and thickness of mat underlay will be determined by the athletic flooring requirements. Coordinate with manufacturer's literature.  
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Resilient mat underlay shall be prefabricated granulated indoor/outdoor rubber mat bound with polyurethane for shock absorption. Mat thickness shall be [\_\_\_\_\_] mm inches.

## 2.8 ADHESIVES

Adhesive shall be as recommended by the flooring manufacturer and must correspond to the specified flooring product and to the substrate.

## 2.9 CRACK FILLER/LEVELER FOR CONCRETE SURFACES

Crack filler/leveler for concrete floor surfaces shall be as recommended by flooring manufacturer.

## 2.10 EDGING STRIPS

Strips shall be of the same material and design as recommended by flooring manufacturer.

## 2.11 PRIMER

Concrete primer shall be as recommended by flooring manufacturer and must correspond to the specified flooring product and to the substrate.

## 2.12 GAME LINE MATERIAL

Game line material shall as recommended by the flooring manufacturer and must correspond to the specified flooring product.

## 2.13 WALL BASE

Base shall be [rubber] [vinyl], Type [straight] [coved] style. Base shall be 100 mm 4 inches high and minimum 2 mm 0.080 inch thick.

## 2.14 SEALANTS

Sealants shall be in accordance with Section 07 92 00 JOINT SEALANTS.

## 2.15 MANUFACTURERS COLOR

Color shall be [in accordance with Section 09 06 90 COLOR SCHEDULE] [\_\_\_\_\_] .

## PART 3 EXECUTION

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NOTE: Expansion joints under resilient athletic flooring should be avoided to the maximum extent

possible by placing the joints at the perimeter of the floor area. For large areas such as gymnasiums, shrinkage compensating concrete may be advisable.

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### 3.1 PREPARATION

Concrete surfaces shall be completely cured and dry. No curing agents, sealers, or hardeners shall be used to aid in the curing of the concrete slab. Surfaces shall be free of paint spots, and other foreign materials. Surfaces shall be ground down or leveled with an approved leveling compound to a tolerance of plus or minus 3 mm 1/8 inch within a 3 meters 10 foot radius. Cracks, construction joints, or damaged portions of floor shall be filled with crack filler for concrete surfaces. Expansion joints shall be filled and sealed in accordance with the approved installation instructions of the manufacturer. All sealants shall be in accordance with ASTM C 920. Expansion joints shall not be filled with a material that will make them inoperable.

### 3.2 MOISTURE TEST

The suitability of the concrete subfloor for receiving the resilient flooring with regard to moisture content shall be determined by a moisture test as recommended by the flooring manufacturer.

### 3.3 INSTALLATION

#### 3.3.1 General Requirements

Installation shall be in accordance with the approved installation instructions. Tile or sheet flooring shall be rolled with a medium-sized roller in both directions to release entrapped air.

#### 3.3.2 Molded Rubber Base

Base shall be installed in accordance with the approved installation instructions of the manufacturer of the base.

#### 3.3.3 Indoor-Outdoor Carpeting

Application of flooring shall be as recommended by the manufacturer.

#### 3.3.4 Sheet Vinyl Composition Flooring

Concrete slab shall be primed in accordance with approved installation instructions. Flooring shall be installed as recommended by the manufacturer.

##### 3.3.4.1 Seams

End seams shall be cut and placed as recommended by the manufacturer. Seams shall be weighted as required.

##### 3.3.4.2 Hot-welded Seams

Butted sheets shall be grooved to a depth of approximately two thirds of their total thickness using an electrical or hand grooving tool. Grooved seams shall be thermowelded using a hot air welding tool and a PVC welding thread. After seam has cooled to room temperature, the excess shall be

trimmed off to provide a flush joint.

### 3.3.5 Sheet Rubber Composition Flooring

Sheet flooring shall be dry cut and layed out flat a minimum of 24 hours prior to adhering to the substrate. End seams shall be single cut. Edge seams shall be cut through overlapping sheets, then snapped into place to ensure tight seams. Seams shall be weighted as required.

### 3.3.6 Rubber Composition Tile Flooring

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NOTE: Tile flooring can be installed with adhesive  
or without adhesive using a mechanical locking  
technique. Edit to comply with the type flooring  
specified.  
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#### 3.3.6.1 Application With Adhesive

Tiles shall be layed on adhesive surface in pattern according to approved detail drawings. Joints of tiles shall be even and tight. Tiles shall be cut to fit tightly against the wall.

#### 3.3.6.2 Application Without Adhesive

Tiles shall be joined together using interlocking ears or other mechanical locking techniques. The ears shall interlock into the adjoining tile 40 mm 1-1/2 inches and shall provide at least five interlocks for each 600 mm 24 inch edge. Where required, a beveled transfer border shall be supplied to interlock with the flooring tiles. The borders shall be 150 mm 6 inches wide and 600 mm 24 inches long and the same thickness as the matching tiles.

### 3.3.7 Rubber Poured-in-Place Flooring

Concrete slab shall be primed with primer recommended by manufacturer in a thin film covering approximately 10 square meters/L 400 square feet per gallon. Chloroprene rubber shall be poured onto subfloor and troweled to a smooth and uniform layer of the required thickness. A grout chloroprene rubber coat shall be applied to fill possible voids in surface. After the chloroprene rubber is completely dry, a pigmented finish shall be applied with a spray and roller.

### 3.3.8 Urethane Poured-in-Place Flooring

Concrete slab shall be primed with primer recommended by the manufacturer. Rate of application shall be in accordance with approved installation instructions and shall be allowed to dry odor free. Concrete construction joints shall be covered with 50 mm 2 inch wide PVC duct tape. Resin shall be applied in a minimum of 2 lifts. Pigmented and textured coatings shall be applied in accordance with manufacturer's recommendations.

### 3.3.9 Resilient Mat Underlay

The resilient mat underlay shall be unrolled and allowed to relax prior to cutting or fitting. Mat shall be installed in accordance with manufacturers instructions.

#### 3.3.10 Line Marking and Finishing

After installation is complete, the floor surface shall be cleaned in accordance with installation instructions. Line marking shall be laid out, masked, and painted according to approved detail drawings and approved installation instructions. Finishing shall be in accordance with the manufacturer's recommendations.

#### 3.4 PROTECTION

The installed flooring shall be protected from soiling and damage with heavy reinforced, nonstaining kraft paper, plywood, or hardboard sheets as required. Edges of kraft paper protection shall be lapped and secured to provide a continuous cover. Protective covering shall be removed when directed by the Contracting Officer.

-- End of Section --