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USACE / NAVFAC / AFCEC / NASA	**UFGS-09 66 16 (August 2016)**
	Change 1 - 08/18

Preparing Activity: USACE	**Superseding**
	UFGS-09 66 16 (August 2010)

UNIFIED FACILITIES GUIDE SPECIFICATIONS

References are in agreement with UMRL dated July 2023

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SECTION TABLE OF CONTENTS

DIVISION 09 - FINISHES

SECTION 09 66 16

TERRAZZO FLOOR TILE

08/16, CHG 1: 08/18

PART 1 GENERAL

1.1 REFERENCES
1.2 SUBMITTALS
1.3 QUALITY ASSURANCE
1.4 DELIVERY, STORAGE, AND HANDLING
1.5 SITE CONDITIONS
1.6 WARRANTY

PART 2 PRODUCTS

2.1 STANDARD PRODUCTS
2.2 TERRAZZO TILE
2.3 ADHESIVE
2.4 TERRAZZO BASE
2.5 TERRAZZO STRIPS
2.6 METAL EDGE STRIPS
2.7 COLOR

PART 3 EXECUTION

3.1 GENERAL
3.2 EXAMINATION
3.3 SUBSTRATE PREPARATION
3.4 MOISTURE TEST
3.5 INSTALLATION
3.5.1 Tile
3.5.2 Metal Edge Strips
3.5.3 Terrazzo Base/Strips
3.6 CLEANING
3.7 PROTECTION

-- End of Section Table of Contents --

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SECTION 09 66 16

TERRAZZO FLOOR TILE
08/16, CHG 1: 08/18

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NOTE: This guide specification covers the requirements for cast marble or granite terrazzo tile of various sizes and thicknesses).

Adhere to UFC 1-300-02 Unified Facilities Guide Specifications (UFGS) Format Standard when editing this guide specification or preparing new project specification sections. Edit this guide specification for project specific requirements by adding, deleting, or revising text. For bracketed items, choose applicable item(s) or insert appropriate information.

Remove information and requirements not required in respective project, whether or not brackets are present.

Comments, suggestions and recommended changes for this guide specification are welcome and should be submitted as a Criteria Change Request (CCR).

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PART 1 GENERAL

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 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.

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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 C97/C97M	(2015) Absorption and Bulk Specific Gravity of Dimension Stone
ASTM C109/C109M	(2021) Standard Test Method for Compressive Strength of Hydraulic Cement Mortars (Using 2-in. or (50-mm) Cube Specimens)
ASTM C501	(2021) Standard Test Method for Relative Resistance to Wear of Unglazed Ceramic Tile by the Taber Abraser
ASTM D2047	(2017) Standard Test Method for Static Coefficient of Friction of Polish-Coated Floor Surfaces as Measured by the James Machine
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

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

SOUTH COAST AIR QUALITY MANAGEMENT DISTRICT (SCAQMD)

SCAQMD Rule 1168	(2017) Adhesive and Sealant Applications

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, 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.

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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

Terrazzo Tile; G[, [_____]]

SD-03 Product Data

Terrazzo Tile

Recycled Content for Terrazzo Tile; S

Adhesive

Indoor Air Quality for Adhesive; S

Installation

SD-04 Samples

Terrazzo Tile

Terrazzo Base

Metal Edge Strips

SD-10 Operation and Maintenance Data

Manufacturer's Maintenance Instructions; G[, [_____]]

SD-11 Closeout Submittals

Warranty

1.3 QUALITY ASSURANCE

Installer must possess, to the satisfaction of the Contracting Officer, the technical qualifications, experience, trained personnel, and facilities to properly install the specified items.

1.4 DELIVERY, STORAGE, AND HANDLING

Deliver materials to the jobsite in the manufacturer's original unopened containers marked with the manufacturer's brand name, color, and pattern. Store materials delivered and placed in storage protected from damage, weather, humidity and temperature variation, dirt and dust, or other contaminants. Temperature of storage area must not be lower than 10 degrees C 50 degrees F or higher than 32 degrees C 90 degrees F.

1.5 SITE CONDITIONS

Do not install tiles until other work that could cause damage to the finished flooring has been completed. Maintain a temperature of not less than 21 degrees C 70 degrees F in all areas where tile is to be installed for a period of not less than [48] [_____] hours before, during and after laying of tiles. Bring tiles into installation areas and allow to condition at not less than 21 degrees C 70 degrees F for a period of [48] [_____] hours prior to installation. After installation of tiles, maintain a minimum temperature of 13 degrees C 55 degrees F.

1.6 WARRANTY

Provide manufacturer's standard performance guarantees or warranties that extend beyond a one year period.

PART 2 PRODUCTS

2.1 STANDARD PRODUCTS

Provide materials which are the standard products of a manufacturer regularly engaged in the manufacture of the material and that essentially duplicate products that have been in satisfactory use at least 2 years prior to bid opening.

2.2 TERRAZZO TILE

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NOTE: Designer will select the chip requirements and also determine whether flexible or rigid resin is required, or give the Contractor the options. The source of the aggregate will directly impact the look of the tile.

Coordinate with manufacturer's data of terrazzo tile when determining the patterns, styles, sizes and thicknesses of tiles.
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NOTE: Use materials with recycled content where appropriate for use. Verify suitability, availability within the region, cost effectiveness and adequate competition (including verification of bracketed percentages included in this guide specification) before specifying product recycled content requirements.

Research shows the product is commonly available with the minimum recycled content percentages shown below. Based on research, insert desired minimum percentages into the empty set of brackets.
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Provide terrazzo tile of the indicated colors and consisting of [marble] [or] [granite] chips embedded in a [flexible] [or] [rigid] thermoset resin matrix. Submit drawings indicating pattern, size, style, and color of tiles and two 150 by 150 mm 6 by 6 inch minimum samples of each color and pattern of terrazzo tile to be used. Tiles must be [5] [_____] mm [3/16] [_____] inch thick and nominal [300 by 300] [_____] mm [12 by 12] [_____] inches. Provide tiles with a [polished] [polished and [honed] [textured]] [honed] [textured] finish with uniform color distribution of chips. [Grade marble chips to [16] [6] mm [5/8] [1/4] inch maximum size.] [Granite chips must be manufacturer's standard gradation.] Provide tile with the following properties:

TERRAZZO TILE PROPERTIES		
PROPERTY	TEST METHOD	VALUE
Compressive Strength	ASTM C109/C109M	20 MPa 3000 psi minimum
Water Absorption	ASTM C97/C97M	0.7 percent maximum
Abrasive Wear	ASTM C501	Index 28
Coefficient of Friction	ASTM D2047	0.5 wet
Flame Spread	ASTM E84	Class A
Critical Radiant Flux	ASTM E648	Class I

[

Provide Terrazzo Tile with [50][100][_____] percent recycled aggregate. Provide data identifying percentage of recycled content for terrazzo tile.]

2.3 ADHESIVE

Adhesive must be flooring manufacturer's standard product or a product recommended by the manufacturer. Submit documentation from manufacturer indicating that the materials conform to the specified requirements and

flooring manufacturer's approval of underlayment, adhesive, and cleaners. Adhesive products used on the interior of the building (defined as inside of the weatherproofing system) must meet either emissions requirements of CDPH SECTION 01350 (limit requirements for either office or classroom spaces regardless of space type) or VOC content requirements of SCAQMD Rule 1168. Provide validation of indoor air quality for adhesive.

2.4 TERRAZZO BASE

Provide terrazzo base of colors as indicated, meeting the requirements of paragraph TERRAZZO TILE and being a manufacturer's standard product. Base/strips must be [10] [19] mm thick by [_____] mm wide by [_____] mm long [3/8] [3/4] inch thick by [_____] inch wide by [_____] inch long. Provide base/strips that have [polished] [honed] [textured] finish. Submit two 100 mm 4 inch long samples of each type and color of trim pieces.

2.5 TERRAZZO STRIPS

Provide terrazzo strips of colors as indicated, meeting the requirements of paragraph TERRAZZO TILE and being a manufacturer's standard product. Strips must be [_____] mm high by [_____] mm wide by [_____] mm long [3/8] [3/4] inch high by [_____] inch wide by [_____] inch long. Strips must have [polished] [honed] [textured] finish. Submit two 100 mm 4 inch long samples of each type and color of trim pieces.

2.6 METAL EDGE STRIPS

Metal edge strips must be extruded aluminum, butt type, approximately 40 mm 1-1/2 inches wide with thickness to set top surface flush with top of tile and with bevel at exposed edge. Edge strips must have countersunk holes near each end and spaced not more than 200 mm 8 inches on center for securement. Submit one 150 mm 6 inch long sample of metal edge strip

2.7 COLOR

Color must be [as indicated] [in accordance with Section 09 06 00 SCHEDULES FOR FINISHES] [_____].

PART 3 EXECUTION

3.1 GENERAL

Install flooring and base on floor surfaces and walls where indicated. Except as required for installation of new tile, keep traffic new tile for at least [24] [_____] hours after installation.

3.2 EXAMINATION

After becoming familiar with details of the work, verify dimensions in the field, and advise the Contracting Officer of any discrepancy before performing the work.

3.3 SUBSTRATE PREPARATION

Fill holes and cracks with mortar. Floors must be free of curing compounds, grease, dirt, loose particles and other foreign matter that would prevent adhesion. Chip and grind smooth projecting irregularities. Fill depressions and level uneven surfaces. Rinse subfloors and allow to

dry prior to applying adhesive.

3.4 MOISTURE TEST

After concrete floor surfaces have been cleaned, spread small patches of adhesive in several locations in each room or area to receive tile and allowed to dry overnight. If the adhesive can be peeled easily from the floor surfaces, the surface is not sufficiently dry. Repeat the steps until the adhesive adheres properly. Do not apply tiles until adhesive adheres tightly to the floor.

3.5 INSTALLATION

Submit the manufacturer's printed installation instructions for the conditions indicated.

3.5.1 Tile

Install tile in accordance with the manufacturer's approved installation instructions, except as specified herein. Lay tile symmetrical about center lines of rooms or areas. Joints must be tight, inconspicuous as possible, and in alignment. Cut tile to fit snugly at pipes and other vertical surfaces. Seal joints at pipes with adhesive. Remove spots or smears of adhesive immediately. Entire surface of finished tile floor must be smooth, straight, and free from bleeding adhesive, buckles, waves, or projecting tile edges upon completion. Bleeding of adhesive on finished floors is cause for rejection by the Contracting Officer. Remove and replace damaged or rejected tiles.

3.5.2 Metal Edge Strips

Secure edge strips with No. 10 aluminum alloy, counter-sunk, flathead machine screws with expansion sleeves. Provide exposed edges of tile with one-piece metal edge strips.

3.5.3 Terrazzo Base/Strips

Terrazzo base/strips must be continuous and adhesively applied. Joints must be tight and inconspicuous in same manner as floor tile.

3.6 CLEANING

Upon completion of the installation and after adhesive has cured, thoroughly clean flooring in accordance with the manufacturer's recommendations.

3.7 PROTECTION

Cover and protect the terrazzo tile work from damage until completion of the work of all other trades. Remove and replace defects which develop, such as loose, broken, or curled tiles. Submit [six] [_____] copies of the Manufacturer's Maintenance Instructions.

-- End of Section --