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Preparing Activity: Agency

UFC 1-300-02 FORMAT STANDARD for
UNIFIED FACILITIES GUIDE SPECIFICATIONS

References are in agreement with UMRL dated July 2020

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08-11

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SYNTHETIC TURF SYSTEM
08-11

NOTE: This specification covers the requirements
for SYNTHETIC TURF SYSTEM.

PART 1 GENERAL

1.1 REFERENCES

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.

The surface irregularity of playing surface shall be checked by straight-edge

DIN EN 13036-7 FIFA regulation and standard <10mm.

ASTM INTERNATIONAL (ASTM)

ASTM D1335	(2017; E 2018) Standard Test Method for Tuft Bind of Pile Yarn Floor Coverings
ASTM D1907/D1907M	(2012; R 2025) Standard Test Method for Linear Density of Yarn (Yarn Number) by the Skein Method
ASTM D2256/D2256M	(2021) Standard Test Method for Tensile Properties of Yarns by the Single-Strand Method
ASTM D2261	(2013; R 2017) Standard Test Method for Tearing Strength of Fabrics by the Tongue (Single Rip) Procedure (Constant Rate-of-Extension Tensile Testing Machine)
ASTM D2859	(2016) Standard Test Method for Ignition Characteristics of Finished Textile Floor Covering Materials
ASTM D4491/D4491M	(2017) Standard Test Methods for Water Permeability of Geotextiles by Permittivity

ASTM D5034	(2009; R 2017) Standard Test Method for Breaking Strength and Elongation of Textile Fabrics (Grab Test)
ASTM D5793	(2018) Standard Test Method for Binding Sites Per Unit Length or Width of Pile Yarn Floor Coverings
ASTM D5823	(2019; R 2024) Standard Test Method for Tuft Height of Pile Floor Coverings
ASTM D5848	(2020) Standard Test Method for Mass Per Unit Area of Pile Yarn Floor Coverings
ASTM E648	(2023) Standard Test Method for Critical Radiant Flux of Floor-Covering Systems Using a Radiant Heat Energy Source
ASTM E794	(2024) Standard Test Method for Melting And Crystallization Temperatures by Thermal Analysis
ASTM F355	(2023) Standard Test Method for Impact Attenuation of Playing Surface Systems, Other Protective Sports Systems, and Materials Used for Athletics, Recreation and Play
ASTM F963	(2023) Standard Consumer Safety Specification for Toy Safety
ASTM F1015	(2003; R 2017) Standard Test Method for Relative Abrasiveness of Synthetic Turf Playing Surfaces

DEUTSCHES INSTITUT FUR NORMUNG (DIN)

DIN 18035-7	(2019) Sports grounds - Part 7: Synthetic turf areas
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INTERNATIONAL ORGANIZATION FOR STANDARDIZATION (ISO)

ISO 4892-2	(2013) Plastics - Methods of exposure to laboratory light sources - Part 2: Xenon-arc lamps - Third Edition
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EUROPEAN NORMALIZATION

DIN EN 13036-7	(2003) Road and airfield surface characteristics - Test methods Part 7 : Irregularity measurement of pavement courses: The straightedge test
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1.2 DEFINITIONS

For the purposes of this specification, the following definitions apply.

1.2.1 Synthetic Turf

Synthetic grass surfaces having over 11,000dtex thickness and density like natural grass.

1.2.2 Aggregate Courses

Aggregate course is well graded, crushed, durable aggregate uniformly moistened and mechanically stabilized by compaction.

1.2.2.1 FIFA Regulation for aggregate course

<u>Property</u>	<u>Specification(Result)</u>	<u>Test Method</u>
Surface Regularity of playing surface	<10 mm(3 m straight edge)	DIN EN 13036-7
Surface Regularity of sub-base	<10 mm(3 m straight edge) <2 mm (300 mm straight edge)	DIN EN 13036-7

1.3 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 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

Installation; G

SD-03 Product Data

Synthetic Turf System; G

Surface Preparation; G

Installation; G

Turf Marking System; G

SD-04 Samples

Synthetic Turf System; G

SD-07 Certificates

Synthetic Turf System; G

SD-10 Operation and Maintenance Data

Synthetic Turf System; G

Cleaning and Protection; G

1.4 DELIVERY AND STORAGE

Deliver equipment and materials to the site in the manufacturer's original wrappings and packages clearly labeled with the manufacturer's name, brand name, roll width and length, pile height, color and related information. Store materials in a clean, dry, well ventilated area, protected from damage and soiling, and maintain at a temperature above 16 degrees C for minimum one day prior to installation.

1.5 WEATHER LIMITATIONS

Install synthetic turf system when the atmospheric temperature is above 2 degrees C. When the temperature falls below 2 degrees C, protect all completed areas by approved methods against detrimental effects of freezing. Correct completed areas damaged by freezing, rainfall, or other weather conditions to meet specified requirements.

1.6 PLANT, EQUIPMENT, AND TOOLS

All plant, equipment, and tools used in the performance of the work must be subject to approval before the work is started and maintain in satisfactory working condition at all times. The equipment must be adequate and have the capability of producing the required compaction, meeting grade controls, thickness control, and smoothness requirements as

set forth herein.

1.7 PRE-INSTALLATION CONFERENCE

Pre-installation conference will be required by the Contracting Officer. Ensure that all of the involved subcontractors, suppliers, and manufacturers are represented. Furnish the date and time of the conference to the Contracting Officer for approval. Provide five copies of the manufacturer's printed [installation](#) instructions for the synthetic turf system, including preparation of substrate seaming techniques, and recommended adhesives and tapes prior to conference.

1.7.1 Verification of Dimensions

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

1.8 MANUFACTURER'S SERVICE

The manufacturer must provide field quality control personnel to observe and approve the installation/application of their products. The representative must be present at the site at all times during the installation of the synthetic turf system.

1.8.1 Field Training

Four hours of field training must be provided by the synthetic turf manufacturer for designated maintenance personnel. Start the training before the system is functionally complete. Field training must cover all of the items contained in the operating and maintenance manuals.

1.9 GENERAL REQUIREMENTS

1.9.1 Standard Products of [Synthetic Turf System](#)

Materials and equipment must be standard products of a manufacturer regularly engaged in the manufacture of the products and must essentially duplicate items that has been in satisfactory use in the Republic of Korea for at least 3 years prior to bid opening. Equipment must be supported by a service organization that is, in the opinion of the Contracting Officer, reasonable convenient to the site.

Submit samples for approval as follows;

Synthetic Turf System: Two "Production Quality" samples **300 x 300 mm** of the proposed material for use, showing quality, and color specified.

Special Treatment Materials: Two samples showing system and installation method.

1.9.2 [Turf Marking System](#)

Submit manufacturer's proposal data and printed documentation stating physical characteristics, compatibility and resistance to fading.

1.10 CERTIFICATE FOR [SYNTHETIC TURF SYSTEM](#)

Submit certificates of compliance from a laboratory approved by the

contracting officer attesting that each type of material conforms to the standards specified. Infill may conform to domestic patent for rubber infill and Synthetic Turf fiber must be obtained by the test procedure presented in [ASTM F963](#) and [DIN 18035-7](#)

1.11 WARRANTY

Manufacturer's standard performance warranties including minimum five (5) year wear warranty, two (2) year material and workmanship and five (5) year tuft bind and delamination.

1.12 MAINTENANCE OF [SYNTHETIC TURF SYSTEM](#)

Submit five copies of synthetic turf system manufacturer's maintenance instructions describing recommended type of cleaning equipment and material, spotting and cleaning methods, and cleaning cycles.

PART 2 PRODUCTS

2.1 [SYNTHETIC TURF SYSTEM](#)

Submit manufacturer's proposal data and printed documentation stating physical characteristics, durability, resistance to fading, eco-friendly environmental safety and flame resistance characteristics of materials and installation accessory 30 days prior to the time the material will be required in the work.

2.2 SYNTHETIC TURF

NOTE: Before selecting a protective surfacing system, evaluate the different types of protective surfacing systems to determine the most appropriate surfacing for the climate, accessibility, play value, and cost. Consider life cycle maintenance cost.

Synthetic Surfacing System: Synthetic surfacing systems, either unified or combined, meet accessibility requirements and have less daily maintenance requirements than loose-fill surfacing systems. Synthetic surfacing systems have limited play value. These systems may be used to add color patterns to the playground to be used for play activities.

Loose Fill Surfacing System: The only loose fill surfacing that meets accessibility is engineered wood fiber. To maintain accessibility there needs to be a commitment to replenishing the material every month with the same engineered material. Some loose-fill materials such as sand, not only provide a good impact attenuation surface, but have excellent play value. Loose fill surfacing systems require daily maintenance to maintain impact attenuation performance due to material displacement, decomposition, and compression.

Depth of Material: Depth of the protective

**surfacing is determined by both the fall height and
the type of protective surfacing system selected.**

The synthetic turf must conform to the following physical properties:

2.2.1 Monofilament Synthetic Turf

<u>Property</u>	<u>Specification</u>	<u>Test Method</u>
	<u>Result</u>	<u>Units</u>
Material	Polyethylene	Manufacturer's Manual
Melting Point	120 +/- 10	degree C
Heavy Metal's content	DOC(Without EXO)<=20 DOC(With EXO)<= 40 EOX <= 100 Pb <= 0.04 Cd <= 0.005 Cr <= 0.05 CrVi <= 0.008 Hg <= 0.001 Zn <= 3.0 Sn <= 0.05 Sb <= 60 As <= 25 Ba <= 500 Se <= 500	mg/l mg/l mg/kg mg/l mg/l mg/l mg/l mg/l mg/l mg/kg mg/kg mg/kg mg/kg
Resistance to pulling out	>30(6.7)Non-infilling >30(6.7)Infilling	N(lbf)
Pile Height	60 +/- 5%	mm
Weight Pile Yarn	outer yarn > 38 Total > 68	oz/yd2
Pile Count	5/8 +/- 1/8	Gauge/inch
Tensile Strength	Length > 1100(246) Width > 1100(246)	N(lbf)
Weather ability	Length > 90 Width > 90	Retained%
Tearing Strength	Length > 140(31) Width > 140(31)	N(lbf)
Yarn Count	12,500.0 +/- 10%	dtex
Strength of filament yarn C.R.E	> 85(19)	N(lbf)
Elongation of Filament yarn	> 35	%

<u>Property</u>	<u>Specification</u>	<u>Test Method</u>
	<u>Result</u>	<u>Units</u>
Flammability	PASS	ASTM D2859
Water Permeability	> 500 > 20	mm/h inch/h
Relative Abrasiveness	< 35	Abrasive Index
Critical Radiant Flux	> Class 2 NFPA	W/cm ² Classification
Shock Absorbing Properties	< 200	Average G-Max read

ASTM D2859

ASTM D4491/D4491M
Constant head method

ASTM F1015

ASTM E648

ASTM F355

2.2.2 Fibrillate Synthetic Turf

<u>Property</u>	<u>Specification</u>	<u>Test Method</u>
	<u>Result</u>	<u>Units</u>
Material	Polyethylene	Manufacturer's Manual
Melting Point	120 +/- 10	degree C
Heavy Metal's content	DOC(Without EXO)<=20 DOC(With EXO)<= 40 EOX <= 100 Pb <= 0.04 Cd <= 0.005 Cr <= 0.05 CrVi <= 0.008 Hg <= 0.001 Zn <= 3.0 Sn <= 0.05 Sb <= 60 As <= 25 Ba <= 500 Se <= 500	mg/l mg/l mg/kg mg/l mg/l mg/l mg/l mg/l mg/l mg/kg mg/kg mg/kg mg/kg
Resistance to pulling out	>30(6.7)Non-infilling N(lbf) >30(6.7)Infilling	ASTM D1335
Pile Height	60 +/- 5%	mm
Weight Pile Yarn	outer yarn > 47 Total > 76 Backing1 > 4 Backing2 > 25	oz/yd2
Pile Count	5/8	Gauge/inch
Tensile Strength	Length > 1100(246) Width > 1100(246)	N(lbf) C.R.E, Grab Method

ASTM E794, DSC

DIN 18035-7
ASTM F963

ASTM D5823

ASTM D5848

ASTM D5793

ASTM D5034
C.R.E, Grab Method

<u>Property</u>	<u>Specification</u>	<u>Test Method</u>
	<u>Result</u>	<u>Units</u>
Weather ability	Length > 90 Width > 90	Retained% 500h UV exposure
Tearing Strength	Length > 140(31) Width > 140(31)	N(lbf) C.R.E Tongue method
Yarn Count	11,000.0 +/- 10%	dtex ASTM D1907/D1907M
Strength of filament yarn C.R.E	> 85(19)	N(lbf) ASTM D2256/D2256M
Elongation of Filament yarn	> 35	% C.R.E ASTM D2256/D2256M
Flammability	PASS	ASTM D2859
Water Permeability	> 500 > 20	mm/h inch/h ASTM D4491/D4491M Constant head method
Relative Abrasiveness	< 35	Abrasive Index ASTM F1015
Critical Radiant Flux	> Class 2 NFPA	W/cm ² Classification ASTM E648
Shock Absorbing Properties	< 200	Average G-Max read ASTM F355

2.2.3 Infill

The infill must consist of a resilient layered system, comprised of selected and graded silica sand and rubber.

<u>Property</u>	<u>Specification</u>	<u>Test Method</u>
	<u>Result</u>	<u>Units</u>
Heavy Metal's content	DOC(Without EXO)</=20 DOC(With EXO)</= 40 EOX </= 100 Pb </= 0.04 Cd </= 0.005 Cr </= 0.05 CrVi </= 0.008 Hg </= 0.001 Zn </= 3.0 Sn </= 0.05 Sb </= 60 As </= 25 Ba </= 500 Se </= 500	mg/l mg/l mg/kg mg/l mg/l mg/l mg/l mg/l mg/l mg/kg mg/kg mg/kg mg/kg
		DIN 18035-7 ASTM F963

2.3 BEDDING MATERIALS FOR SURFACE PREPARATION

2.3.1 Subgrade

Subgrade material must comply with Section 31 00 00 EARTHWORK.

2.3.2 Aggregate Base Course

Aggregate base course material must comply with Section 32 11 23 [AGGREGATE] [AND/OR] [GRADED-CRUSHED AGGREGATE BASE COURSE].

PART 3 EXECUTION

3.1 INSTALLATION SHOP DRAWINGS

Submit five copies of drawings indicating areas receiving synthetic turf system.

3.2 SYNTHETIC TURF SYSTEM

The equipment and tools required when installing the synthetic turf product must be in accordance with the written instructions of the manufacturer.

3.3 INSTALL BEDDING MATERIALS

Submit procedures for accomplishing surface preparation work. Install subgrade and aggregate base course in accordance with Section 31 00 00 EARTHWORK and Section 32 11 23 [AGGREGATE BASE COURSE] [AND/OR][GRADED CRUSHED AGGREGATE BASE COURSE] FOR FLEXIBLE PAVING, respectively.

3.4 CLEANING AND PROTECTION

When the operation is completed, clean up and protect the site. Restore existing areas that have been damaged during the installation to original condition at the Contractor's expense.

3.4.1 Cleaning

After installation of the synthetic turf system, remove debris, scraps, and other matter. Remove soiled spots and adhesive glue from the face of the turf carpet. Cut off and remove protruding face yarn. Clean synthetic turf system.

3.4.2 Protection

Protect the installed synthetic turf system from soiling and damage with heavy reinforced, non-staining kraft paper, plywood, or hardboard sheets. Lap and secure edges of kraft paper protection shall be lapped and secured to provide a continuous cover. Restrict traffic for at least 45 hours. Smoking is prohibited on the field for protection of burning.

3.5 REMNANTS

Remnants from the installation, consisting of scrap pieces more than 600mm (2 feet) in any dimension with more than 0.6 square meters (6 square feet) total area, may be turned in to the installation company.

-- End of Section --

