Preparing Activity: USACE Superseding
UFGS-34 73 13 (April 2008)

UNIFIED FACILITIES GUIDE SPECIFICATIONS

References are in agreement with UMRL dated July 2023
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SECTION 34 73 16

AIRFIELD GROUNDING
11/19

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NOTE: This guide specification covers requirements for airfield grounding points.

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

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NOTE: Specify the items to provide ground points with a resistance of no more than 10,000 ohms to ground if the resistance of the surrounding soil or rock is less than 2 000 000 ohm-centimeters. In high resistivity soils of over 2 000 000 ohm-centimeters, allow 3 m 10 ft or sectional rods to be used to obtain the required resistivity to ground; however, where rock is encountered, additional rods, a counterpoise, or ground grid may be necessary. Allow resistance to ground for static electricity dissipation to be as much as 1 000 000 ohms. Static grounds are not designed for aircraft lightning protection or for equipment grounding.

It is recommended that this specification, and other

contract requirements for grounding points, be coordinated with UFC 3-260-01, Airfield and Heliport Planning and Design.

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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 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 B8	(2011; R 2017) Standard Specification for Concentric-Lay-Stranded Copper Conductors, Hard, Medium-Hard, or Soft
ASTM B371/B371M	(2008; R 2013) Standard Specification for Copper-Zinc-Silicon Alloy Rod

NATIONAL FIRE PROTECTION ASSOCIATION (NFPA)

NFPA 407	(2022; TIA 21-1) Standard for Aircraft Fuel Servicing

UNDERWRITERS LABORATORIES (UL)

UL 467	(2022) UL Standard for Safety Grounding and Bonding Equipment

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

As-Built Drawings; G[, [_____]]

SD-06 Test Reports

Tests

SD-07 Certificates

Grounding Rods

Copper Conductors

Grounding Connectors

1.3 AS-BUILT DRAWINGS

Submit as-built drawngs that provide current factual information, including deviations from and amendments to the drawings and changes in

the work, concealed and visible.

PART 2 PRODUCTS

2.1 METALS

Do not use a combination of materials that forms an electrolytic couple, which accelerates corrosion in the presence of moisture, unless moisture is permanently excluded from the junction of such metals.

2.2 GROUNDING RODS

Use grounding rods, unless otherwise indicated, in accordance with UL 467 and made of copper-clad steel, copper, galvanized steel, or copper-zinc-silicone alloy. Use rods not less than 19 mm 3/4 in in diameter and not less than 3 m 10 ft long. Use copper cladding in accordance with ASTM B371/B371M, Copper Alloy UNS No's. c 69400, c 69430, c 69440 or c 69450. Use copper cladding not less than 0.25 mm 0.010 in thick at any point and complying with adherence requirements and the banding requirements of UL 467. Submit certificates of compliance stating that the grounding rods meet the specified requirements. Provide rods with a closed eye or shepherd's hook bend having an inside diameter of not less than 38 mm 1-1/2 in. [Use pointed rods unless used for flexible pavement.] [For flexible pavement, use rods having 19 mm 3/4 in American standard rolled threads for attachment of a bottom anchor and equipped with a screw-type bottom having a wing diameter of not less than 127 mm 5 in.]

2.3 COPPER CONDUCTORS

Use copper conductors that bare number 4 AWG copper wire in accordance with ASTM B8. Submit certificates of compliance stating that the copper conductors meet the specified requirements.

2.4 GROUNDING CONNECTORS

Use grounding connectors that comply with UL 467 for the required application. Submit certificates of compliance stating that the grounding connectors meet the specified requirements.

PART 3 EXECUTION

Prior to installing grounding rods, obtain approved digging permits in accordance with Section 01 11 00 SUMMARY OF WORK.

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NOTE: Remove types of grounding point installations not needed.

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3.1 GROUNDING POINTS

Locate the grounding points as shown on the drawings to within plus or minus 50 mm 2 in.

3.1.1 Pavement Recess

Set the top of the grounding rod at or not more than 6 mm 1/4 in below the pavement surface grade. Provide a recess 75 mm 3 in wide, and not more than 150 mm 6 in long, with a smooth rounded edge in the pavement around the grounding point anchor eye to permit the entrance of lines into the eye and to allow for attachment of the grounding cable. Do not allow the depth of the recess to be deeper than the bottom of the opening of the grounding point eye.

3.1.2 Installation

3.1.2.1 Existing Rigid Pavement

Install grounding rods in holes cored through the rigid pavement using rotary, non-percussion drilling techniques. Check that the core holes have a minimum diameter of 150 mm 6 in. Check that the sides of the core hole are perpendicular to the pavement surface. Install the grounding rod by pushing or driving the rod through the pavement base courses and subgrade. Do not allow the installation technique chosen to damage the grounding rod or the pavement. Complete installation by placing concrete around the grounding rod in lifts not to exceed 150 mm 6 in in depth and consolidate each lift using spud vibrators.

3.1.2.2 New Rigid Pavement

Install the grounding rod by pushing or driving the rod through the pavement base courses and subgrade prior to concrete placement. Do not allow the installation technique chosen to damage the grounding rod. Keep hand finishing around the rod to a minimum.

3.1.2.3 Flexible Pavement

Install grounding rods in Portland cement concrete blockouts measuring 1.2 by 1.2 m 4 by 4 ft in plan dimensions. The thickness and reinforcing details are shown on the drawings. Install the grounding rod by pushing or driving the rod through the pavement base courses and subgrade prior to concrete placement. Do not allow the installation technique chosen to damage the grounding rod. Keep hand finishing around the rod to a minimum.

3.1.3 Interconnection

For grounding rods installed at fueling hydrant outlets, electrically interconnect with the fuel piping with not less than a number 4 AWG bare copper conductor.

3.2 TESTS

Submit an independent testing agency's certified reports of inspections and tests, including analysis and interpretation of test results. Properly identify each report. Describe test methods and standards used. Measure resistance to ground tests as specified in NFPA 407. Submit test results to the Contracting Officer. Report immediately to the Contracting Officer ground rods that have more than 10,000 ohms of resistance.

-- End of Section --