

## APPENDIX A UFC 1-200-01 GLOSSARY

### A-1

### ACRONYMS

|            |  |
|------------|--|
| AA&E       | Arms, Ammunition, and Explosives   |
| ABA        | Architectural Barriers Act   |
| AE         | Ammunition and Explosives  |
| AEC        | Architect / Engineer / Construction  |
| AFCEC      | Air Force Civil Engineer Center  |
| AFMAN      | Air Force Manual   |
| AHJ        | Authority Having Jurisdiction  |
| BO         | Building Official  |
| BIA        | Bilateral Infrastructure Agreement   |
| CCR        | Criteria Change Request  |
| CECW-EC    | Corps of Engineers Civil Works, Chief of Engineering and Construction Division |
| CP         | Cathodic Protection  |
| CPC        | Corrosion Prevention & Control   |
| CFR        | Code of Federal Regulations  |
| CTR        | Component Technical Representative   |
| DAFMAN     | Department of the Air Force Manual   |
| DCS        | Deputy Chief of Staff  |
| DoDD       | DoD Directive  |
| DoDI       | DoD Instruction  |
| DoDM       | DoD Manual   |
| DUSD (I&E) | Deputy Under Secretary of Defense for Installations and Environment            |
| DWG        | Discipline Working Group   |

|         |  |
|---------|--|
| EI&E    | Energy, Installations, and Environment     |
| ESC     | Environmental Severity Classification      |
| ESEP    | Engineering Senior Executive Panel         |
| ESQD    | Explosives Safety Quantity Distance        |
| E.O.    | Executive Order                            |
| FASS    | Facilities Systems Safety                  |
| FC      | Facilities Criteria                        |
| HQ      | Headquarters                               |
| HQMC    | Headquarters, U.S. Marine Corps            |
| HQUSACE | Headquarters, U.S. Army Corps of Engineers |
| HNFA    | Host Nation Funded Construction Agreements |
| HVAC    | Heating, Ventilation, and Air Conditioning |
| IBC     | International Building Code®               |
| ICC     | International Code Council                 |
| ICCET   | ISO Corrosivity Category Estimation Tool   |
| IEBC    | International Existing Building Code®      |
| IECC    | International Energy Conservation Code®    |
| IE&E    | Installations, Energy, and Environment     |
| IE&L    | Installations, Environment, and Logistics  |
| IFC     | International Fire Code®                   |
| IFGC    | International Fuel Gas Code®               |
| IgCC    | International Green Construction Code®     |
| IMC     | International Mechanical Code®             |
| IPC     | International Plumbing Code®               |
| IPMC    | International Property Maintenance Code®   |

|        |   |
|--------|---|
| IRC    | International Residential Code®                                     |
| LPG    | Liquified Petroleum Gas   |
| MCM    | Metal Composite Materials   |
| MDF    | Medium Density Fiberboard   |
| NAF    | Naval Air Facility  |
| NAVFAC | Naval Facilities Engineering Systems Command                        |
| NDAA   | National Defense Authorization Act                                  |
| NEC    | National Electrical Code®   |
| O&M    | Operations and Maintenance  |
| OEBDG  | Overseas Environmental Baseline Guidance Document<br>(DoDM 4715.05) |
| OSHA   | Occupational Safety and Health Administration                       |
| OASD   | Office of the Assistant Secretary of Defense                        |
| OUSD   | Office of the Under Secretary of Defense                            |
| P.L.   | Public Law  |
| RFP    | Request for Proposal  |
| RMF    | Risk Management Framework   |
| SAP    | Special Access Program  |
| SCI    | Sensitive Compartmented Information                                 |
| SOFA   | Status of Forces Agreements   |
| SOH    | Safety and Occupational Health                                      |
| TOC    | Total Ownership Costs   |
| USACE  | U.S. Army Corps of Engineers  |
| USC    | United States Code  |
| UFC    | Unified Facilities Criteria   |
| UFGS   | Unified Facilities Guide Specifications                             |

USD (AT&L)

Under Secretary of Defense for Acquisition, Technology, and Logistics

**DEFINITION OF TERMS**

**Critical Asset:** A specific facility, system, infrastructure, or resource whose failure or degradation would have a serious, immediate, or cascading impact on a Mission Essential Function (MEF) or Primary Mission Essential Function (PMEF).

**Discipline Working Group:** Representatives from the DoD components responsible for the unification and maintenance of criteria documents. (MIL-STD-3007)

**Engineering Senior Executive Panel:** Panel established by the DoD Installations Policy Board to implement the UFC and UFGS system for DoD. The ESEP consists of a representative from the Office of the Secretary of Defense and the three Service Chiefs of Engineering. (MIL-STD-3007)

**Facilities Criteria:** A criteria document that is not adopted by all services and will be used only by services indicated in the document

**Mission Critical Facility:** One whose loss, degradation, or disruption would immediately and directly compromise a DoD mission, resulting in failure of a mission, loss of life, severe operational degradation, loss of significant combat capability, and/or loss of required command and control.

**Mission Essential Facility:** One that is necessary for successful mission execution, but its temporary loss does not immediately result in mission failure. Its degradation creates major impediments, reduces operational efficiency, increases mission risk, and/or requires rapid restoration.

**Mission Support Facility:** One that provides indirect support to mission execution. Its loss degrades quality of life, slows mission execution, causes administrative or support delays, but does not directly cause mission failure.

**Technical Representative:** Author of a particular criteria document or the working-level representative from another participating organization for a particular document. (MIL-STD-3007)

## APPENDIX A UFC 1-200-01 REFERENCES

### AMERICAN SOCIETY OF HEATING, REFRIGERATING AND AIR-CONDITIONING ENGINEERS

<https://www.ashrae.org>

ANSI/ASHRAE/IESNA Standard 90.1, *Energy Standard for Buildings Except Low-Rise Residential Buildings* (Refer to chapter 2 of UFC 1-200-02, for applicable publication date)

### AMERICAN SOCIETY OF MECHANICAL ENGINEERS

<https://www.asme.org>

### AMERICAN SOCIETY OF SAFETY PROFESSIONALS

<https://www.assp.org>

ANSI/ASSP Z590.3, *Prevention through Design: Guidelines for Addressing Occupational Hazards and Risks in Design and Redesign Processes*

### AMERICAN WELDING SOCIETY

<https://www.aws.org/>

AWS D1.1/D1.1M 2020

Structural Welding Code

### CODE OF FEDERAL REGULATIONS

<https://www.osha.gov/laws-regs/regulations/standardnumber/1910>

29 CFR 1910, *Occupational Safety and Health Standards*

### INTERNATIONAL CODE COUNCIL

<https://www.iccsafe.org>

IBC, *International Building Code*<sup>®</sup>, 2024

IEBC, *International Existing Building Code*<sup>®</sup>, 2024

IECC, *International Energy Conservation Code*<sup>®</sup> (Refer to Chapter 2 of UFC 1-200-02 for applicable edition)

IgCC, *International Green Construction*, (Refer to UFC 1-200-02 for applicable edition)

IMC, *International Mechanical Code*<sup>®</sup>, 2024

IPC, *International Plumbing Code*<sup>®</sup>, 2024

IRC, *International Residential Code*<sup>®</sup>, 2024

## **INTERNATIONAL ORGANIZATION FOR STANDARDIZATION**

<https://www.iso.org/>

ISO 9223, *Corrosion of Metals and Alloys – Corrosivity of Atmospheres – Classification, Determination and Estimation*

## **NATIONAL FIRE PROTECTION ASSOCIATION**

<https://www.nfpa.org>

NFPA 1, *Fire Code*

NFPA 54 (ANSI Z223.1), *National Fuel Gas Code*

NFPA 58, *Liquefied Petroleum Gas Code*

NFPA 70, *National Electrical Code*®

NFPA 101, *Life Safety Code*®

NFPA 285, *Standard Fire Test Method for Evaluation of Fire Propagation Characteristics of Exterior Wall Assemblies Containing Combustible Components*

## **UNIFIED FACILITIES CRITERIA**

<https://www.wbdg.org/dod/ufc>

UFC 1-200-02, *High Performance and Sustainable Building Requirements*

UFC 1-201-01, *Non-Permanent DoD Facilities in Support of Military Operations*

UFC 1-201-02, *Assessment of Existing Facilities for Use in Military Operations*

UFC 1-300-02, *Unified Facilities Guide Specifications (UFGS) Format Standard*

FC 1-300-09N, *Navy and Marine Corps Design Procedures*

UFC 3-101-01, *Architecture*

UFC 3-110-03, *Roofing*

UFC 3-120-01 Design: Sign Standards

UFC 3-120-10, *Interior Design*

UFC 3-130-04 Arctic and Subarctic Buildings

UFC 3-190-06, *Protective Coatings and Paints*

UFC 3-201-01, *Civil Engineering*

UFC 3-201-02, *Landscape Architecture*

UFC 3-210-10, *Low Impact Development*

UFC 3-220-01, *Geotechnical Engineering*

UFC 3-230-01, *Water Storage and Distribution*

UFC 3-230-03, *Water Treatment*

UFC 3-240-01, *Wastewater Collection and Treatment*

UFC 3-301-01, *Structural Engineering*

UFC 3-301-02, *Design of Risk Category V Structures, National Strategic Military Assets*  
UFC 3-401-01, *Mechanical Engineering*  
UFC 3-410-01, *Heating, Ventilating, and Air Conditioning Systems*  
UFC 3-420-01, *Plumbing Systems*  
UFC 3-430-05, *Natural Gas and Liquefied Petroleum Gas (LPG) Distribution Pipelines*  
UFC 3-460-01, *Design: Petroleum Fuel Facilities*  
UFC 3-490-06, *Elevators*  
UFC 3-501-01, *Electrical Engineering*  
UFC 3-520-01, *Interior Electrical Systems*  
UFC 3-530-01, *Interior and Exterior Lighting Systems and Controls*  
UFC 3-540-01, *Engine-Driven Generator Systems for Prime and Standby Power Applications*  
UFC 3-550-01, *Exterior Electrical Power Distribution*  
UFC 3-560-01, *Operation and Maintenance: Electrical Safety*  
UFC 3-570-01, *Cathodic Protection*  
UFC 3-580-01, *Telecommunications Interior Infrastructure Planning and Design*  
UFC 3-600-01, *Fire Protection Engineering for Facilities*  
UFC 3-701-01, *DoD Facilities Pricing Guide*  
UFC 4-010-01, *DoD Minimum Antiterrorism Standards for Buildings*  
UFC 4-010-05, *SCIF/SAPF Planning, Design, and Construction*  
UFC 4-010-06, *Cybersecurity of Facility-Related Control Systems*  
UFC 4-021-01, *Design and O&M: Mass Notification Systems*  
UFC 4-510-01, *Design: Military Medical Facilities*  
UFC 4-711-01, *Family Housing*  
UFC 4-721-10, *Navy and Marine Corps Unaccompanied Housing*

#### **UNITED STATES ACCESS BOARD**

Architectural Barriers Act (ABA) Standards  
<https://www.access-board.gov/files/aba/ABASTandards.pdf>

#### **UNITED STATES AIR FORCE**

<https://www.e-publishing.af.mil>

DESR6055.09\_AFMAN91-201, *Explosives Safety Standards*

DAFMAN 91-203, *Air Force Occupational Safety, Fire and Health Standards*

## **UNITED STATES ARMY**

<https://armypubs.army.mil/>

DA PAM 385-64, *Ammunition and Explosives Safety Standards*

DA PAM 385-16, *System Safety Management Guide*

## **UNITED STATES DEPARTMENT OF DEFENSE**

*Deputy Secretary of Defense Memorandum for Secretaries of the Military Departments, et al.*  
*Subject: Access for People with Disabilities, October 31, 2008*

<https://www.access-board.gov/aba/background/dod-policy-memo.html>

DoDM 4715.05, *Overseas Environmental Baseline Guidance Document*

<https://www.esd.whs.mil/Directives/issuances/dodm/>

DoD 5200.08-R, *Physical Security Program*

<https://www.esd.whs.mil/DD/DoD-issuances/OUSSD>

DoDI 6055.01, *DoD Safety and Occupational Health (SOH) Program*

<https://www.esd.whs.mil/DD/DoD-issuances/>

DoDM 6055.09, *DoD Ammunition and Explosives Safety Standards*

<https://www.esd.whs.mil/DD/DoD-issuances/>

DoDI 1125.03, *Vending Facility Program for the Blind on DoD-Controlled Federal Property*

<https://www.esd.whs.mil/DD/DoD-issuances/>

DoDM 5100.76, *Physical Security of Sensitive Conventional Arms, Ammunition and Explosives (AA&E)*

<https://www.esd.whs.mil/DD/DoD-issuances/>

DoDM 5200.01, *DoD Information Security Program*

<https://www.esd.whs.mil/DD/DoD-issuances/>

DoDM 5205.07 Volume 3, *DoD Special Access Program (SAP) Security Manual: Physical Security*

<https://www.esd.whs.mil/DD/DoD-issuances/>

MIL-STD-3007G, *Standard Practice for Unified Facilities Criteria, Facilities Criteria and Unified Facilities Guide Specifications*, 1 November 2019

<https://www.wbdg.org/FFC/FEDMIL/milstd3007g.pdf>

*OUSD Memorandum. Subject: Department-Wide Policy for Nursing and Lactation Rooms*, 1 November 2016 [https://www.wbdg.org/FFC/DOD/DOD\\_NursingMothersMemo\\_110116.pdf](https://www.wbdg.org/FFC/DOD/DOD_NursingMothersMemo_110116.pdf)

*OUSD Memorandum for Assistant Secretary(s) of the Army (IE&E), Navy (EI&E), Air Force (IE&L), Directors of Defense Agencies, Directors of Defense Activities, Director, Washington Headquarters Service. Subject: Floodplain Management on Department of Defense Installations*, 11 February 2014 [https://www.wbdg.org/FFC/DOD/DUSDIE\\_Memo\\_FloodplainMgmt.pdf](https://www.wbdg.org/FFC/DOD/DUSDIE_Memo_FloodplainMgmt.pdf)

## **UNITED STATES NAVY**

NAVSEA OP 5, *Ammunition and Explosives Safety Ashore*  
<https://nossa.dc3n.navy.mil/nrws3/> (must be registered user)

**UNITED STATES OFFICE OF PERSONNEL MANAGEMENT**

*OPM Guide for Establishing a Federal Nursing Mother's Program*  
<https://www.opm.gov/policy-data-oversight/worklife/reference-materials/nursing-mother-guide.pdf>

## APPENDIX A UFC 1-200-02 GLOSSARY

### A-1

### ACRONYMS

|        |   |
|--------|---|
| ≥      | greater than or equal to  |
| >      | greater than  |
| ≤      | less than or equal to   |
| <      | less than   |
| AFCEC  | Air Force Civil Engineer Center   |
| AFARS  | Army Federal Acquisition Regulation Supplement                            |
| AFFARS | Air Force Federal Acquisition Regulation Supplement                       |
| AHJ    | Authority Having Jurisdiction   |
| APF    | Appropriated Funding  |
| ASHRAE | American Society of Heating, Refrigerating and Air Conditioning Engineers |
| ASTM   | American Society of Testing and Materials                                 |
| BEAP   | Base Exterior Architecture Plan   |
| BSI    | Business Systems Integration Directorate (EI&E Office)                    |
| CF     | Cubic Feet  |
| CFR    | Code of Federal Regulations   |
| CONUS  | Continental United States   |
| DFARS  | Defense Federal Acquisition Regulation Supplement                         |
| DOE    | Department of Energy  |
| DoD    | Department of Defense   |
| DoDI   | Department of Defense Instruction   |
| ECA    | Energy Compliance Analysis  |
| EEIM   | Enterprise Energy Information Management                                  |
| EISA   | Energy Independence and Security Act                                      |
| EMS    | Environmental Management System   |

|         |   |
|---------|---|
| EPA     | Environmental Protection Agency                   |
| EPAcT   | Energy Policy Act                                 |
| EPEAT   | Electronic Product Environmental Assessment Tool  |
| ERC     | Estimated Replacement Cost                        |
| FAR     | Federal Acquisition Regulation                    |
| FEMP    | Federal Energy Management Program                 |
| GBCI    | Green Business Certification Incorporated         |
| GBI     | Green Building Initiative                         |
| GPF     | Gallons per Flush                                 |
| GSA     | General Services Administration                   |
| GSF     | Gross Square Feet                                 |
| GSM     | Gross Square Meters                               |
| HPSB    | High Performance Sustainable Building             |
| HQUSACE | Headquarters, U.S. Army Corps of Engineers        |
| HVAC    | Heating, Ventilation and Air Conditioning         |
| IAQ     | Indoor Air Quality                                |
| ICC     | International Code Council                        |
| IECC    | International Energy Conservation Code            |
| IESNA   | Illuminating Engineering Society of North America |
| KWh     | Kilowatt Hour                                     |
| LCC     | Life-Cycle Cost                                   |
| LCCA    | Life-Cycle Cost Analysis                          |
| LCCE    | Life-Cycle Cost Effective                         |
| LEED    | Leadership in Energy and Environmental Design     |
| LPF     | Liters per Flush                                  |
| MIL-STD | Military Standard                                 |

|        |  |
|--------|--|
| MOU    | Memorandum of Understanding  |
| NAF    | Non-Appropriated Funding   |
| NAVFAC | Naval Facilities Engineering Systems Command                       |
| NIST   | National Institute of Standards and Technology                     |
| NMCARS | Navy Marine Corps Acquisition Regulation Supplement                |
| OCONUS | Outside Continental United States                                  |
| ODS    | Ozone Depleting Substances   |
| O/M    | Operations and Maintenance   |
| OMB    | Office of Management and Budget                                    |
| PL     | Public Law   |
| RCRA   | Resource Conservation and Recovery Act                             |
| RPA    | Real Property Accountability                                       |
| SDHW   | Solar Domestic Hot Water   |
| SF     | Square Foot  |
| SHPO   | State Historic Preservation Office                                 |
| SMACNA | Sheet Metal and Air Conditioning Contractors' National Association |
| SNAP   | Significant New Alternatives Policy                                |
| TPC    | Third-Party Certification  |
| UFC    | Unified Facilities Criteria  |
| UFGS   | Unified Facilities Guide Specifications                            |
| USGBC  | U.S. Green Building Council  |
| US     | United States  |
| USACE  | U.S. Army Corps of Engineers                                       |
| USC    | U.S. Code  |
| USDA   | United States Department of Agriculture                            |
| WBDG   | Whole Building Design Guide  |

**Acquisition:** A multidisciplinary process encompassing a variety of functions that involve all facets of life-cycle management, including determination of need, planning; design; construction, lease, or purchase; sustainment, modernization, and disposal of military installations and facilities as well as other goods and services. Acquiring supplies and services is a process governed by Federal, Defense, and service branch specific Acquisition Regulations (FAR, DFARS, and AFFARS, AFARS, or NMCARS) and Public Law (PL). Together there are more than 4,000 documents controlling the acquisition process. The acquisition process depends upon: (1) who the customer is, (2) the source of the item to be acquired, and (3) what type of funds are to be used, Appropriated (APF) or Non-Appropriated (NAF). In general, the Military Construction Program process is funded by Appropriated Funds. However, projects for Non-Appropriated Funds activities (commissaries, bowling centers, etc.) use NAF funds for building construction, upgrades, special equipment, and furnishings. APF funding is used most typically for demolition and environmental work on NAF activity sites. A combination of APF and NAF funds may be used.

**Alternative Water Sources:** Non-potable water from sources such as harvested rainwater (refer to UFC 3-210-10), treated wastewater, air handler condensate capture, grey water, or reclaimed water. The use of alternative water sources must comply with applicable codes and standards.

**Authority Having Jurisdiction (AHJ):** The term "Authority Having Jurisdiction" (AHJ) as used in the codes and standards referenced in this UFC means the Service office of responsibility, i.e., U.S. Army, HQ USACE/CECW-CE; U.S. Navy, NAVFACENGCOM HQ Code CHE; U.S. Marine Corps, HQMC Code LFF-1; and U.S. Air Force, AFCEC. The enforcement of the codes and standards as they pertain to facility projects can be delegated to the local Service Office's Chief Engineer's Technical Representative at the discretion of the Service's aforementioned office.

**Building:** Per UFC 1-300-08, "A roofed and floored facility enclosed by exterior walls and consisting of one or more levels that is suitable for single or multiple functions."

**Charrette:** An intensive creative work session in which a design team focuses on a particular design problem and arrives at a collaborative solution with stakeholders from the project area. A charrette can be a breakthrough event that helps create a meaningful master plan or facility design. Properly executed, this technique can produce a master plan or facility design that is more useful, better understood, and more quickly produced than one formed by any other method.

**Commercial and Multi-Family High-Rise Residential Buildings:** All buildings, other than low-rise residential buildings.

**Commissioning:** Per ASHRAE 90.1-2019: Quality-focused process for enhancing the delivery of a project for verifying and documenting that the building and its systems, controls, and building envelope are planned, designed, installed, tested, and include plans for operation and maintenance to meet specified requirements.

**Component:** One of the Military Departments, Defense Agencies, or DoD Field Activities, per USD (AT&L) Memorandum dated 29 May 2002.

**Comprehensive Replacement:** Comprehensive replacement to a building includes significant opportunities for improvement in: energy and water efficiency (such as HVAC, lighting, building envelope and other building components); indoor air quality; other requirements in this UFC; and additions that are part of the comprehensive replacement. /1/

**DD Form 1391:** A programming document used by the Department of Defense to submit requirements and justifications in support of funding requests for military construction to Congress.

**Employee Work Areas:** Per International Building Code 2015: “All or any portion of a space use by employees and only for work. Corridors, toilet rooms, kitchenettes and break rooms are not employee work areas.”

**Energy Compliance Analysis (ECA):** The ECA must identify specific energy conservation criteria that applies to the project, the software used to prepare the necessary calculations, a summary of all input to and output from the calculations, and the calculated energy consumption of the proposed design.

**Energy Modeling:** The process by which conceptual designs, including size; material choices; factors such as site and solar orientations; daylighting percentages; and energy system choices (solar water heat, underfloor vs. overhead air distribution systems) are analyzed to show how to optimize these factors for efficient building operation and resource consumption.

**Energy Optimization:** The process of evaluating strategies to comply with Federal, DoD, and service component energy requirements. The process is an element of integrated design and includes strategy identification, energy modeling, LCCA, and strategy selection based on results.

**Energy Resilience:** Per DoDI 4170.11, “The ability to prepare for and recover from energy disruptions that impact mission assurance on military installations.”

**Environmental Management System (EMS):** A framework that helps to achieve environmental goals through consistent control of operations. The assumption is that this increased control will improve environmental performance.

**Environmentally Preferable Products:** Products or services having a lesser or reduced effect on human health and the environment when compared with competing products or services serving the same purpose. This comparison may consider raw materials acquisition, production, manufacturing, packaging, distribution, reuse, operation, maintenance, or product or service disposal.

**Estimated Replacement Cost (ERC):** ERC is the cost listed in the project’s DD1391 “Economic Analysis.” ERC is the cost of replacing the current physical plant with modern facilities built at today’s construction costs using today’s construction standards.

**Facility:** Per UFC 1-300-08, a building, structure, or linear structure out to an imaginary line surrounding a facility at a distance of five feet from the foundation that, barring specific direction to the contrary such as a utility privatization agreement, denotes what is included in the basic record for the facility (examples: landscaping, sidewalks, utility connections). This imaginary line is commonly referred to as the “five-foot line.”

**Historic Properties:** Properties that are included in the National Register of Historic Places or that meet the criteria for the National Register.

**Life Expectancy:** The terms life expectancy and study period are used interchangeably for LCCA in 10 CFR 436, EISA 2007, and NIST Handbook 135. Per 10 CFR 436 “study period is the expected life of the retrofit or new building.”

**Life-Cycle Costing (LCC):** An important economic analysis used in the selection of alternatives that impact both pending and future costs. It compares initial investment options and identifies the cost alternatives for a 40-year period. As applied to building design energy conservations measures, the process is mandated by law and is defined in 10 CFR Part 436, Subpart A: *Methodology and Procedures for Life-Cycle Cost Analysis*. The National Institute of Standards and Technology has established the Building Life-Cycle Cost (BLCC) computer program to perform LCC analyses. The program incorporates user entered data for and compares the following: Sunk Costs, First Costs, Salvage Value, Future Investment, Residual Value, Annually Recurring Fixed Costs, Annually Recurring Escalating Costs, and Energy (Fuel Costs) Escalation Rates.

**Life-Cycle Cost Analysis (LCCA):** Assessment of the direct, indirect, recurring, nonrecurring, and other related costs incurred or estimated to be incurred in the design, development, production, operation, maintenance, support, and final disposition of a major system over its anticipated useful life span. LCCA considers all costs (capital, operating, and decommissioning expenses for the duration of a project) for various alternative approaches, including inflation and discount rates.

**Life-Cycle Cost Effectiveness (LCCE):** LCCE is a state of having a LCC that is equal to or lower than a baseline OR having a lower LCC than all alternatives, depending on the applicable criteria. This includes a documented statement of costs to be incurred to complete all stages of a project from planning through acquisition, maintenance, operation, remediation, disposition, long-term stewardship, and disposal. The results of a LCCA.

**Low-Rise Residential Buildings:** All buildings three stories or less in height above grade that include sleeping accommodations where the occupants are primarily permanent in nature (30 days or more).

**Planning:** Initiated by a using entity whose facility needs are driven by mission requirements. The insertion of facility projects into the official budget is based on the requirement for mission support. As mission priorities change, projects can be moved ahead of their initial scheduled fiscal year or alternatively, be dropped altogether.

**Process load:** The load on a building resulting from energy consumed in support of a manufacturing, industrial, or commercial process. Process loads do not include energy consumed maintaining comfort and amenities for the occupants of the building (including space conditioning for human comfort).

**Programming:** The data collection process done by the military project management team in order to achieve a conceptual design in enough detail to prepare a viable cost estimate. Programming data is reported on DD Form 1391 for design-bid-build and design-build projects and is scrutinized from Installation-level through the Office of Management and Budget (OMB), Congress, and signed by the President before it is approved as a project.

**Project Definition:** As the military programming process often predates actual design by two to five years or more, when the design services portion of a project is funded, the project design team must validate stated project requirements and personnel assignments based upon updated mission criteria. This process is sometimes referred to as Project Definition to distinguish it from the usual private sector A/E reference to “programming.”

**Project Scope:** Refers to the physical size, cost, and mission of a project. With historical data on facilities for various missions, experienced programmers will formulate the conceptual design for the DD Form 1391 based upon the required size of a facility to accommodate mission functions. Once the scope for a project has been enacted by Congress, changing the scope of a project will delay a project until the revision has been justified and approved. This is true whether or not the costs have also changed. Reductions of project scope (by no more than 25%) will require Congressional notification, review, and authorization before proceeding. Increasing the project scope is not authorized without reprogramming. See USC Title 10 Section 2853 for more information.

**Real Property Asset:** An individual building, structure, linear structure or land parcel, owned by the Department of Defense.

**Receptacle Load:** The load on a building resulting from energy consumed by all equipment plugged into electrical outlets.

**Recommissioning:** Per DOE Guidance 42 USC 8253(f), “The process of commissioning a previously commissioned facility or system after expiration of the project development and warranty phase. The primary goal of recommissioning is to optimize facility performance, in accordance with design or operating needs, over the useful life of the facility.”

**Resilience:** The ability to prepare for and recover from disruptions that impact mission assurance on military installations.

**Resource-efficient solutions:** Solutions that minimize energy, water, natural, and human resources required.

**Retrocommissioning:** Per DOE Guidance 42 USC 8253(f), “The retroactive commissioning of equipment or a system that was not commissioned at the time of installation or during the warranty phase. Typically, retrocommissioning is performed long after the facility is constructed and placed into service.”

**Service:** When used to describe a DoD entity, one of the three Military Departments under the DoD, per USD (AT&L) Memorandum dated 29 May 2002.

**Stand-Alone Additions:** Stand-alone additions are scoped to function like stand-alone new buildings. Although the addition is attached to an existing building, all of its new systems operate separately from the existing building.

**Structure:** Per UFC 1-300-08, a facility, other than a building or linear structure (road, fence, etc.), that is constructed on or in the land.

**Sustainable Site:** Based on the selection process, a site is considered sustainable when it uses less energy, water, and natural resources, generates less waste, and minimizes the impact on land compared to conventional design, construction, and maintenance techniques.

**Sustainment, Restoration, and Modernization (SRM):** Per the Office of the Assistant Secretary of Defense for Sustainment, Construction:

- Sustainment activities include scheduled and unscheduled inspection, maintenance and repair to ensure facilities remain in good working order throughout their service lives.
- Restoration activities include repair and replacement efforts to renovate facilities damaged by inadequate sustainment, excessive age, natural disaster, fire, accident, or other causes.
- Modernization activities include implementation of new or higher standards; accommodating new functions; or replacing building components that typically last more than 50 years.

**Third-Party Certification (TPC):** TPC is the generic term for a third-party product that provides either certification of the third-party vendor’s proprietary product requirements (examples: LEED, Green Globes), or a validation program by the third-party vendor that this UFC’s requirements have been met (examples: Guiding Principles Assessment, Guiding Principles Compliance.)

**Total Ownership Cost (TOC):** Total of all direct and indirect costs associated with an asset or acquisition over its entire life cycle.

**Tracking:** Method by which each Service internally validates HPSB Guiding Principles compliance, with the use of HPSB Checklist.

## APPENDIX A UFC 1-200-02 REFERENCES

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NOTE: Include all references Errata, except Errata for Addenda. Include Interpretations, except Interpretations for Addenda. Do not include Addenda. Exception: include ASHRAE 90.1-2019 Addendum ch for energy consumption reduction value as cited in paragraph titled "[Commercial and Multi-Family High-Rise Residential Buildings.](#)"

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USC Title 16 Section 106, *National Historic Preservation Act*

42 U.S.C. § 6962, Federal Procurement

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10 CFR Part 433, *Energy Efficiency Standards for New Federal Commercial and Multi-Family High-Rise Residential Buildings*

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## **UNITED STATES DEPARTMENT OF AGRICULTURE**

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<http://www.biopREFERRED.gov/>

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## **UNITED STATES DEPARTMENT OF ENERGY**

Federal Energy Management Program (FEMP)

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## **UNITED STATES ENVIRONMENTAL PROTECTION AGENCY**

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## APPENDIX A UFC 3-101-01 GLOSSARY

### A-1 ACRONYMS

|        |   |
|--------|---|
| AAMA   | American Architectural Manufacturer Association                           |
| ASCE   | American Society of Civil Engineers                                       |
| ACI    | American Concrete Institute   |
| AF     | Air Force   |
| AFCEC  | Air Force Civil Engineer Center   |
| AFMAN  | Air Force Manual  |
| AHJ    | Authority Having Jurisdiction   |
| AICUZ  | Air Installation Compatible Use Zones                                     |
| ANSI   | American National Standards Institute                                     |
| AR     | Army Regulations  |
| ASA    | Acoustical Society of America   |
| ASHRAE | American Society of Heating, Refrigeration and Air Conditioning Engineers |
| ASTM   | American Society of Testing and Materials                                 |
| AT     | Antiterrorism   |
| BIA    | Brick Industry Association  |
| BIM    | Building Information Modeling   |
| BLCC   | Building Life Cycle Cost  |
| C      | Celsius   |
| CADD   | Computer-aided Design and Drafting  |
| CBD    | Chronic Beryllium Disease   |
| CCB    | Construction Criteria Base  |
| CCR    | Criteria Change Request   |
| CFR    | Code of Federal Regulations   |

|         |  |
|---------|--|
| CNEL    | Community Noise Equivalent Level                       |
| CONUS   | Continental United States                              |
| CSA     | Canadian Standards Association                         |
| DNL     | Day Night Average Sound Level                          |
| DoD     | Department of Defense                                  |
| ECB     | Engineering and Construction Bulletins                 |
| EIFS    | Exterior Insulation Finish System                      |
| EIMA    | EIFS Industry Members Association                      |
| EPA     | Environmental Protection Agency                        |
| EPG     | Electronic Project Generator                           |
| ESC     | Environmental Severity Classification                  |
| F       | Fahrenheit   |
| FACD    | Functional Analysis Concept Development                |
| FEC     | Facilities Engineering Command                         |
| FGI     | Facilities Guidelines Institute                        |
| ft      | Foot or feet   |
| HEMP    | High-Altitude Electromagnetic Pulse                    |
| HEPA    | High-Efficiency Particulate Air                        |
| Hg      | Mercury  |
| HNFA    | Host Nation Funded Construction Agreements             |
| HPSB    | High Performance and Sustainable Building Requirements |
| HQUSACE | Headquarters, U.S. Army Corps of Engineers             |
| GCC     | Geographic Combatant Commander                         |
| GSA     | General Services Administration                        |
| IBC     | International Building Code                            |

|         |   |
|---------|---|
| ICD     | Intelligence Community Directive                  |
| ICS     | Intelligence Community Standard                   |
| IESNA   | Illuminating Engineering Society of North America |
| IFS     | Installation Facilities Standards                 |
| in      | Inch or inches                                    |
| IP      | Inch-pound  |
| ISO     | International Organization for Standardization    |
| Kg      | Kilogram  |
| LCCA    | Life Cycle Cost Analysis                          |
| m       | Meters  |
| mm      | Millimeters                                       |
| MPI     | Master Painters Institute                         |
| MWR     | Moral, Welfare and Recreation                     |
| NACE    | National Association of Corrosion Engineers       |
| NASA    | National Aeronautics and Space Administration     |
| NAVFAC  | Naval Facilities Engineering Systems Command      |
| NAVRAMP | Navy's Radon Assessment and Mitigation Program    |
| NC      | Noise Criteria                                    |
| NCPC    | National Capital Planning Commission              |
| NCR     | National Capital Region                           |
| NFRC    | National Fenestration Rating Council              |
| NIC     | Noise Isolation Class                             |
| NIH     | National Institute of Health                      |
| NIST    | National Institute of Standards and Technology    |
| NRCA    | National Roofing Contractors Association          |

|        |  |
|--------|--|
| NS     | Net Savings  |
| OITC   | Outdoor Indoor Transmission Class                                    |
| OSHA   | Occupational Safety and Health Administration                        |
| Pa     | Pascal (SI unit of pressure)   |
| PBS    | Public Buildings Services  |
| PCB    | Polychlorinated Biphenyls  |
| PCR    | Planning Charrette Report  |
| psi    | Pound per square inch  |
| PTS    | Performance Technical Specifications                                 |
| PVC    | Polyvinyl Chloride   |
| RAMP   | Radon Assessment and Mitigation Program                              |
| RC     | Room Criteria  |
| RCRA   | Resource Conservation and Recovery Act                               |
| RF     | Radio Frequency  |
| RFP    | Request for Proposal   |
| SAPF   | Special Access Program Facility                                      |
| SC     | Shading Coefficient  |
| SCIF   | Sensitive Compartmented Information Facility                         |
| SDSFIE | Spatial Data Standard for Facilities, Infrastructure and Environment |
| SEI    | Structural Engineering Institute                                     |
| sf     | square feet  |
| SHGC   | Solar Heat Gain Coefficient  |
| SI     | International System of Units (Metric System)                        |
| SIR    | Savings to Investment Ratio  |
| sm     | square meters  |

|           |  |
|-----------|--|
| SMACNA    | Sheet Metal and Air Conditioning Contractors' National Association |
| SOFA      | Status of Forces Agreement   |
| STC       | Sound Transmission Coefficient                                     |
| TSCA      | Toxic Substances Control Act                                       |
| TM        | Technical Manual(s)  |
| UEPH ARMY | Unaccompanied Enlisted Personnel Housing                           |
| UFC       | Unified Facilities Criteria  |
| UFGS      | Unified Facilities Guide Specifications                            |
| USACE     | U.S. Army Corps of Engineers                                       |
| USGBC     | U.S. Green Building Council  |
| VT        | Visible Transmittance  |
| WBDG      | Whole Building Design Guide  |
| WDMA      | Window and Door Manufacturer Association                           |
| WRB       | Water Resistant Barrier  |

**Air Barrier.** The term “air barrier” refers to the “continuous air barrier” the combination of interconnected materials, assemblies, and sealed joints and components of the building envelope that minimize air leakage into or out of the building envelope specified by ASHRAE 90.1.

**Building System and Subsystems.** An assembly of dimensionally and functionally pre-coordinated subsystems which, when combined, produces an essentially complete building. A subsystem is one of many building components designed and manufactured to be integrated with other subsystems to produce an entire building system.

**Building Information Model (BIM).** A BIM is a three-dimensional digital model of a facility. It incorporates all disciplines and facilitates coordination, calculations of relevant building parameters, and the development of construction documents.

**Corrosion.** Corrosion is the deterioration of a material or its properties due to a reaction of that material with its chemical environment and is inclusive of the deterioration of all materials, which can be caused through sun exposure, mold and mildew, wind, and other environmental elements.

**Environmental Severity Classification (ESC).** Environmental severity is defined as the corrosivity of the local environment of a given location or region. Environmental severity contributes directly to the occurrence of corrosion. The effects of corrosion and the rate at which they occur are consequences of the corrosion system, which is comprised of a material or physical system, the environment, and operational conditions.

**Noise Isolation Class (NIC).** NIC is a method for field transmission ratings. The higher the number the better the noise control. NIC rates a partition's ability to block airborne noise transfer. NIC testing is preferable to STC testing as it is specified on more specific space types (such as spaces with operable walls, unaccompanied housing sleeping rooms to each other or to the adjacent corridor, and the actual work spaces in administration facilities). For a field STC test, the individual transmission loss measurements are modified based upon the reverberation time, the size of the room, and the size of the tested partition. The NIC does not include these modifications and simply measures the transmission loss between 125 and 4,000Hz. The value of this rating is that it better tests the performance of the assembly in the field, though it is highly dependent on field conditions of the tested space.

**Outdoor-Indoor Transmission Class (OITC).** OITC is defined as the A-weighted sound level reduction of a test specimen (or a space) in the presence of an idealized mixture of transportation noises; aircraft takeoff, freeway, and railroad pass-by. It assigns a single number rating to measure Sound Transmission Loss (TL) data obtained in accordance with ASTM E-90. The higher the number, the better the control.

**Sound Transmission Class (STC).** STC is a single number developed under laboratory conditions that represents the effectiveness of materials or construction to

retard the transmission of air-borne sound. It is not as effective for measurement in low frequency noise sources such as mechanical equipment.

## APPENDIX A UFC 3-101-01 REFERENCES

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### **AMERICAN SOCIETY OF CIVIL ENGINEERS (ASCE)**

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ASTM E741, Standard Test Method for Determining Air Change in a Single Zone by Means of a Tracer Gas Dilution

ASTM E783, Standard Test Method for Field Measurement of Air Leakage Through Installed Exterior Windows and Doors

ASTM E1105, Standard Test Method for Field Determination of Water Penetration of Installed Exterior Windows, Skylights, Doors, and Curtain Walls, by Uniform or Cyclic Static Air Pressure Difference

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ASTM E1186, Standard Practices for Air Leakage Site Detection in Building Envelopes and Air Barrier Systems

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### **GENERAL SERVICES ADMINISTRATION (GSA)**

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<http://www.iso.org>

ISO 6781, Thermal Insulation -- Qualitative Detection of Thermal Irregularities in Building Envelopes -- Infrared Method

## **INTERNATIONAL CODE COUNCIL (ICC, IBC)**

<https://www.iccsafe.org/>

International Building Code

International Green Construction Code

## **MASTER PAINTERS INSTITUTE (MPI)**

[www.mpi.net/](http://www.mpi.net/)

Master Painters Institute

## **NATIONAL ASSOCIATION OF CORROSION ENGINEERS (NACE)**

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## APPENDIX A UFC 3-110-03 GLOSSARY

### A-1 ACRONYMS.

|         |   |
|---------|---|
| ACM     | Asbestos containing material  |
| AFCEC   | Air Force Civil Engineer Center   |
| ANSI    | American National Standards Institute                                     |
| APP     | Atactic Polypropylene   |
| ASCE    | American Society of Civil Engineers                                       |
| ASHRAE  | American Society of Heating, Refrigerating and Air Conditioning Engineers |
| ASSP    | American Society of Safety Professionals                                  |
| ASTM    | American Society of Testing and Materials                                 |
| BASH    | Bird/wildlife aircraft strike hazard                                      |
| BIA     | Bilateral Infrastructure Agreement  |
| BUR     | Built-up roof   |
| C       | Celsius   |
| CCR     | Criteria Change Request   |
| CERL    | Construction Engineering Research Laboratories                            |
| CONUS   | Continental United States   |
| COTS    | Commercial Off-the-Shelf  |
| CRREL   | Cold Regions Research and Engineering Laboratory                          |
| CSPE    | Chlorosulfonated Polyethylene   |
| CQM     | Construction Quality Management   |
| DD 1391 | Department of Defense Form 1391   |
| DFT     | Dry Film Thickness  |
| DoD     | Department of Defense   |
| EFVM    | Electric field vector mapping   |

|         |  |
|---------|--|
| EPDM    | Ethylene Propylene Diene Monomer           |
| EPS     | Molded expanded polystyrene board.         |
| ESC     | Environmental Severity Classification      |
| F       | Fahrenheit                                 |
| FCI     | Facility Condition Index                   |
| FM      | Factory Mutual                             |
| FRT     | Fire Retardant Treated                     |
| ft      | Foot or feet                               |
| g       | Gram or Grams                              |
| ga      | Gauge                                      |
| HQUSACE | Headquarters, U.S. Army Corps of Engineers |
| HNFA    | Host Nation Funded Construction Agreements |
| hr      | Hour or Hours                              |
| HVAC    | Heating, ventilation, and air conditioning |
| IBC     | International Building Code                |
| IEBC    | International Existing Building Code       |
| IgCC    | International Green Construction Code      |
| in      | Inch or Inches                             |
| IR      | Infrared                                   |
| IRMA    | Inverted Roof Membrane Assembly            |
| LCCA    | Life cycle cost analysis                   |
| LWCC    | Lightweight cellular concretes             |
| LWIC    | Lightweight insulating concrete            |
| m       | Meter                                      |
| mm      | Millimeter                                 |

|        |   |
|--------|---|
| MB     | Modified bitumen  |
| MBMA   | Metal Building Manufacturers Association                          |
| MREC   | Mesh Reinforced Elastomeric Roof Coating                          |
| NAVFAC | Naval Facilities Engineering Systems Command                      |
| NBS    | National Bureau of Standards                                      |
| NDL    | No Dollar Limit   |
| NMCI   | Navy/Marine Corps Intranet  |
| NRCA   | National Roofing Contractors Association                          |
| O&M    | Operations and Maintenance  |
| OSHA   | Occupational Safety and Health Administration                     |
| PE     | Professional engineer   |
| PFAS   | Personal Fall Arrest System                                       |
| PMMA   | Polymethylmethacrylate  |
| PV     | Photovoltaic  |
| PVC    | Polyvinyl chloride  |
| PVDF   | Polyvinylidene fluoride (also PVF)                                |
| PVF    | Polyvinylidene fluoride (also PVDF)                               |
| QFPF   | Qualified Person for Fall Protection                              |
| RA     | Registered architect  |
| ROI    | Return on investment  |
| RRO    | Registered roofing observer                                       |
| RRC    | Registered roofing consultant                                     |
| SBS    | Styrene Butadiene Styrene   |
| SHPO   | State Historic Preservation Office                                |
| SMACNA | Sheet Metal and Air Conditioning Contractors National Association |

|       |  |
|-------|--|
| SME   | Subject matter expert                  |
| SMS   | Sustainment Management System          |
| SOFA  | Status of Forces Agreements            |
| SPF   | Spray-applied polyurethane foam        |
| SPFA  | Spray Polyurethane Foam Alliance       |
| SPRI  | Single Ply Roofing Industry            |
| SSMR  | Standing Seam Metal Roof               |
| TPC   | Third-Party Certifiers                 |
| TPO   | Thermoplastic Polyolefin               |
| UFC   | Unified Facilities Criteria            |
| UFGS  | Unified Facilities Guide Specification |
| UL    | Underwriters Laboratories Incorporated |
| U.S.  | United States                          |
| USACE | United States Army Corps of Engineers  |
| UV    | Ultraviolet                            |
| VOC   | Volatile Organic Compounds             |
| XPS   | Extruded polystyrene board             |

## A-2 DEFINITION OF TERMS.

See UFC 3-101-01 and the NRCA Roofing Manual for a more complete list of definitions.

**Aggregate:** (1) Crushed stone, crushed slag, or water-worn gravel used for surfacing a built-up roof. (2) Any granular mineral material.

**Asphalt:** A dark brown to black elastomeric cementitious material whose predominating constituents are bitumen's that occur in nature or are obtained in petroleum processing.

**Atactic:** A chain of molecules in which the position of the side methyl groups is more or less random. (Amorphic; Low Crystallinity)

**Ballast:** Loose aggregate, concrete pavers, or other material designed to prevent wind uplift or flotation of a loose-laid roof system.

**Base sheet:** A saturated or coated felt placed as the first ply in a multi-ply bituminous roofing membrane.

**Batten:** (1) Raised rib, in a metal roof, or a separate part or formed portion in a metal roofing panel. (2) One of a series of strips laid in a matrix under tile roof applications.

**Bitumen:** (1) A class of amorphous, black or dark colored, (solid, semisolid, or viscous) cementitious substances natural or manufactured, composed principally of high molecular weight hydrocarbons, soluble in carbon disulfide, and found in asphalts, tars, pitches, and asphaltites; (2) A generic term used to denote any material composed principally of bitumen; (3) In the roofing industry there are two basic bitumens: asphalt and coal-tar pitch. Before application, they are either (a) heated to a liquid state, (b) dissolved in a solvent, or (c) emulsified.

**Bituminous (adj.):** Containing or treated with bitumen. Examples: bituminous concrete, bituminous felts and fabrics, bituminous pavement.

**Bond:** The adhesive and cohesive forces holding two roofing components in intimate contact.

**Boot:** A bellows type covering to exclude dust, dirt, and moisture, forming a flexible closure.

**British thermal unit (BTU):** Heat energy required to raise the temperature of one pound of water by 1<sup>o</sup>F (= 1055 joules).

**Building Code:** Published regulations and ordinances established by a recognized agency describing design loads, procedures, and construction details for structures. Usually applying to designated political jurisdiction (city, county, and state). Building codes control design, construction, and quality of materials, use and occupancy,

location and maintenance of buildings and structures within the area for which the code was adopted (see Model Codes).

**Built-Up Roofing (BUR):** A continuous, semiflexible membrane consisting of plies of saturated felts, coated felts, fabrics, or mats assembled in place with alternate layers of bitumen, and surfaced with mineral aggregate, bituminous material, or a granule surfaced sheet (abbreviation, BUR).

**Cant strip:** A beveled strip used under flashings to modify the angle at the point where the roofing or waterproofing membrane meets any vertical element.

**Cap sheet:** A granule-surfaced coated felt used as the top ply of a built-up roofing membrane.

**Chalking:** A powdery residue on the surface of a material resulting from degradation or migration of an ingredient, or both.

**Chlorosulfonated polyethylene (CSPE):** Family of polymers that are produced by polyethylene reacting with chlorine and sulfur dioxide. Present polymers contain 25-43% chlorine and 1.0-1.4% sulfur. They are used in both vulcanized and nonvulcanized forms. Most membranes based on CSPE are nonvulcanized. ASTM designation for this polymer is CSM. Best known by the DuPont Tradename "Hypalon."

**Coal-Tar Pitch:** A dark brown to black cementitious material produced by the destructive distillation of coal.

**Condensation:** The conversion of water vapor or other gas to liquid as the temperature drops or atmospheric pressure rises.

**Copolymer:** A mixed polymer, the product of polymerization of two or more substances at the same time.

**Corrosion:** The deterioration of a material or its properties due to a reaction of that material with its chemical environment; it is inclusive of the deterioration of all materials, which can be caused through sun exposure, mold and mildew, wind, and other environmental elements.

**Counterflashing:** Formed metal or elastomeric sheeting secured on or into a wall, curb, pipe, rooftop unit, or other surface, to shield the upper edge of a base flashing and its associated fasteners.

**Coverage:** The surface area to be continuously covered by a specific quantity of a particular material.

**Covering:** The exterior roof and wall covering for a metal building system.

**Cricket:** A relatively small, elevated area of a roof constructed to divert water from a horizontal intersection of the roof with a chimney, wall, expansion joint or other projection.

**Curb:** A raised member used to support roof penetrations for features such as skylights, hatches, and equipment.

**Cure:** To change the properties of a polymeric system into a more stable, usable condition by the use of heat, radiation, or reaction with chemical additives. NOTE: Cure may be accomplished, for example, by removal of solvent or cross-linking.

**Deck:** The structural substrate to which the roofing or waterproofing system (including insulation) is applied.

**Design loads:** The “live load” and “environmental load” (such as superimposed loads) that a structure is designed to resist (with appropriate safety factor) plus “dead load” (such as weight of permanent loads).

**Dry (n.):** A material that contains no more water than one would find at its equilibrium moisture content.

**Eave:** The line along the sidewall formed by the intersection of the planes of the roof and wall.

**Elastomer:** A macromolecular material that returns rapidly to its approximate initial dimensions and shape after subsequent release of stress.

**Environmental Severity Classification (ESC):** Environmental severity is defined as the corrosivity of the local environment of a given location or region. Environmental severity contributes directly to the occurrence of corrosion. The effects of corrosion and the rate at which they occur are consequences of the corrosion system, which is comprised of a material or physical system, the environment, and operational conditions.

**EPDM:** A synthetic elastomer based on ethylene, propylene, and a small amount of a non-conjugated diene to provide sites for vulcanization. EPDM features excellent heat, ozone and weathering resistance, and low temperature flexibility.

**Fabric:** A woven cloth of organic or inorganic filaments, threads, or yarns.

**Fabrication:** (1) The manufacturing process performed in a plant to convert raw material into finished metal building components. The main operations are cold-forming, cutting, punching, welding, cleaning, and painting; (2) the creation of large panels of rubber from smaller calendar width sheets as in EPDM.

**Fascia:** A decorative trim or panel projecting from the face of a wall, serving as a weather closure at gable and end wall.

**Felt:** A flexible sheet manufactured by the interlocking of fibers through a combination of mechanical work, moisture, and heat, without spinning, weaving, or knitting. Roofing felts are manufactured from vegetable fibers (organic felts), glass fibers (glass fiber felts) or polyester fibers (synthetic fiber mats).

**Field:** The “job site,” “building site,” or general market area.

**Fixity:** Fixity is the location in which a single metal roof panel is attached to the building structure and is the point from which all thermal expansion radiates. The line of fixity is the line created from the individual points of fixity.

**Flashing:** The system used to seal membrane edges at adjacent perpendicular surfaces (walls), expansion joints, drains, gravel stops, and other places where the membrane is interrupted or terminated. Base flashing covers the edges of the membrane. Cap or counterflashing shields the upper edges of the base flashing.

**Flood coat:** The top layer of bitumen used to hold the aggregate on an aggregate surfaced roofing membrane.

**Fluid-applied elastomer:** An elastomeric material, fluid at ambient temperature, that dries or cures after application to form a continuous membrane.

**Galvalume:** Trade name for steel coated with aluminum-zinc alloy for corrosion protection (55% AlZn).

**Galvanized steel:** Steel coated with zinc for corrosion resistance.

**Granule:** See Mineral Granules.

**Gravel:** Coarse, granular aggregate, with pieces larger than sand grains, resulting from the natural erosion of rock.

**Gutter:** A channel member installed at the eave of the roof for the purpose of carrying water from the roof to the drains or down spouts.

**Humidity:** The amount of moisture contained in the atmosphere. Generally expressed percent relative humidity. (The ratio of the vapor pressure to the saturation pressure for given conditions times 100.)

**Hydrocarbons:** An organic chemical compound containing mainly the elements carbon and hydrogen. Aliphatic hydrocarbons are straight chain compounds of carbon and hydrogen. Aromatic hydrocarbons are carbon-hydrogen compounds based on the cyclic or benzene ring. They may be gaseous (CH<sub>4</sub>, ethylene, butadiene), liquid (hexene, benzene), or solid (Natural rubber, naphthalene, cispolybutadiene).

**Hydrokinetic Metal Roof System:** This is a metal roof system in which the metal standing seam, eaves and valleys accommodate expansion and are constructed in a way which allows some water infiltration. The infiltrating water is drained through weeps

in the roof assembly and with a watertight underlayment membrane under the roof. The fixity will typically be at the ridge in this roof system.

**Hydrostatic Metal Roof System:** The metal standing seam, laps at the eave and valley are construction with positive attachment and non-curing sealant to provide a watertight assembly in this metal roof system. Fixity will typically be at the eave and valleys in this roof system.

**Inorganic (adj.):** Comprising matter other than hydrocarbons and their derivatives, or matter not of plant or animal origin.

**Insulation:** See Thermal Insulation.

**Lap:** Dimension by which a felt covers an underlying felt in BUR membrane. “Edge” or side lap indicates the transverse cover; “End” lap indicates the cover at the end of the roll. These terms also apply to single-ply membranes.

**Loose-laid Membrane:** An unadhered roofing membrane anchored to the substrate only at the edges and penetrations through the roof and ballasted against wind uplift by loose aggregate or pavers.

**Mastic:** Caulking or sealant normally used in sealing roof panel laps.

**Membrane:** A flexible or semi-flexible roof covering or waterproofing whose primary function is the exclusion of water.

**Metal flashing:** See Flashing—frequently used as through-wall, cap, or counterflashing.

**Mineral granules:** Natural or synthetic aggregate, ranging in size from 500 $\mu$ m (1 $\mu$ m = 10-6m) to 1/4 in. diameter, used to surface BUR or modified bitumen cap sheets, asphalt shingles, and some cold process membranes.

**Model Codes:** Codes established to provide uniformity in regulations pertaining to building construction. Example: International Building Code published by the ICC.

**Monomer:** A simple molecule which is capable of combining with a number of like or unlike molecules to form a polymer.

**Mopping:** Application of hot bitumen with a mop or mechanical applicator to the substrate or to the plies of a built-up or modified-bitumen roof. There are four types of mopping: (1) solid—a continuous coating; (2) spot—bitumen is applied in roughly circular areas, generally about 460 mm (18 in.) in diameter, leaving a grid of unmopped, perpendicular area, (3) strip—bitumen is applied in parallel bands, generally 200 mm (8 in.) wide and 300 mm (12 in) apart; (4) sprinkle—bitumen is shaken on the substrate from a broom or mop in a random pattern.

**Neoprene:** Synthetic rubber (polychloroprene) used in liquid or sheet-applied elastomeric roofing membranes or flashing.

**Organic (adj.):** Composed of hydrocarbons or their derivatives; or matter of plant or animal origin.

**Organic coating:** Coatings that are generally inert or inhibited. May be temporary (for example slushing oils) or permanent (such as paints, varnishes and enamels).

**Panel clip:** Independent clip used to attach roof panels to substructure.

**Parapet:** Portion of wall above the roofline.

**Penetration:** The consistency of a bituminous material expressed as the distance in tenths of a millimeter (0.1 mm) that a standard needle or cone vertically penetrates a sample of material under specified conditions of loading, time, and temperature.

**Perlite:** An aggregate used in lightweight insulating concrete and in preformed perlite insulating board, formed by heating and expanding siliceous volcanic glass.

**Phenolic Plastics:** Plastics based on resins made by the condensation of phenols, such as phenol and cresol, with aldehydes.

**Pitch:** See Coal-tar pitch.

**Plastic:** A material that contains as an essential ingredient one or more organic polymeric substances of large molecular weight. It is solid in its finished state and at some stage in its manufacture or processing into finished articles can be shaped by flow.

**Ply:** A layer of felt in a roofing membrane; a four-ply membrane should have at least four plies of felt at any vertical cross section cut through the membrane.

**Polyester Fiber:** Generic name for a manufactured fiber in which the fiber-forming substance is any long chain synthetic polymer composed of an ester of a dihydric alcohol and terephthalic acid. Scrims made of polyester fiber are used for fabric reinforcement.

**Polyisobutylene:** The polymerization product of isobutylene varying in consistency from a viscous liquid to a rubberlike solid, with corresponding variation in molecular weight from 1,000 to 400,000.

**Polyisocyanurate:** Thermoset polymer formed by polymerization of isocyanate; rigid foam insulation meeting ASTM C 1289 *Standard Specification for Faced Rigid Cellular Polyisocyanurate Thermal Insulation Board*; a thermal insulation similar in appearance to polyurethane foam, but with improved fire resistance or rating.

**Polymer:** A macromolecular material formed by the chemical combination of monomers having either the same or different chemical composition. Plastics, rubbers, and textile fibers are all high molecular weight polymers.

**Polyvinyl Chloride (PVC):** A synthetic thermoplastic polymer prepared from vinyl chloride. PVC can be compounded into flexible and rigid forms through the use with plasticizers, stabilizers, filler, and other modifiers; rigid forms used in pipes; flexible forms used in manufacture of sheeting.

**Ponding:** Water in low or irregular roof areas that remains longer than 48 hours after the cessation of rainfall, under conditions conducive to evaporation.

**Preventive Maintenance:** The regular, scheduled, inspection for and the repair of normal, expected breakdown of materials and equipment.

**Prime coat:** First liquid coat applied in a multiple coat system.

**Primer (bituminous):** A thin liquid bitumen applied to a surface to improve the adhesion of heavier applications of bitumen and to absorb dust.

**Protected Membrane Roof (PMR):** Roof assembly with insulation on top of membrane instead of vice versa, as in conventional roof assembly (also known as inverted or upside-down roof assembly).

**Puncture Resistance:** Index of a material's ability to withstand the action of a sharp object without perforation.

**R-Factor:** Resistance to heat flow. The summation of individual thermal resistances in an assembly.

**Rake:** The sloped edge of a roof at the first or last rafter.

**Re-covering:** The process of covering an existing roof system with a new roof.

**Reglet:** A groove in a wall or other surface adjoining a roof surface for the insertion and attachment of counterflashing.

**Relative Humidity:** The ratio of the mass per unit volume (or partial pressure) of water vapor in an air-vapor mixture to the saturated mass per unit volume (or partial pressure) of the water vapor at the same temperature, expressed as a percentage.

**Replacement:** The removal of all roof system components down to the structural deck followed by installation of a completely new roofing system.

**Reroofing:** Replacement or re-cover of an existing roof system.

**Retrofit:** The modification of an existing building or facility to include new systems or components.

**Ridge:** Highest point on the roof of the building, a horizontal line running the length of the building.

**Roof Curb:** An accessory used to mount and level units (such as air conditioning and exhaust fans) on the sloped portion of the building roof.

**Roof Slope:** The angle a roof surface makes with the horizontal, measured in a ratio such as  $\frac{1}{2}$ :12.

**ROOFER Sustainment Management System (SMS):** The ROOFER SMS is a practical decision-making tool to help manage an installation's or base's low-slope membrane and asphalt shingle roofing assets. It includes procedures for collecting inventory and inspection information, evaluating roof condition, identifying repair/replacement strategies, prioritizing projects, and developing work plans. Micro ROOFER, software provides data storage and analysis, and generates management reports. Contact the Service-specific SME to gain access to ROOFER SMS.

**Roofing System:** A combination of interacting components designed to weatherproof, and normally to insulate, a building's or structure's top surface; does not include the roof deck.

**Rubber:** A material capable of quickly recovering from large deformations, normally insoluble in boiling solvent such as benzene, methyl ethyl ketone, and ethanol toluene azeotrope. A rubber in its modified state retracts within 1 mm to less than 1.5 times its original length after being stretched to twice its length.

**Sealant:** Any material used to close up cracks or joints to protect against leaks. Lap sealant is applied to exposed lap edges in E/P systems.

**Sealing Washer:** A metal-backed rubber washer assembled on a screw to prevent water from migrating through the screw hole.

**Seam Strength:** Strength of a seam of material measured either in shear or peel modes, reported either in absolute units, for example, pounds per inch of width—or as a percent of the sheeting strength.

**Service Life:** Anticipated useful life of a building, building component or building subsystem (for example, roof system).

**Shingle:** (1) A small unit of prepared roofing designed for installation with similar units on overlapping rows on inclines normally exceeding 25%; (2) To cover with shingles, and (3) To apply any sheet material in overlapping rows like shingles.

**SI:** The international symbol for the metric unit (Le Systeme International d'Unites).

**Sill:** The bottom horizontal framing member of an opening such as a window or door.

**Skylight:** A roof accessory to admit light, normally mounted on a curbed, framed opening.

**Slope:** Tangent of the angle between the roof surface and the horizontal plane, expressed as a ratio. (See also roof slope)

**Soffit:** The underside covering of any exterior overhanging section of a roof, gable or sidewall.

**Square:** A roof area of 100 ft<sup>2</sup> (9.29 m<sup>2</sup>), or enough material to cover 100 ft<sup>2</sup> (9.29 m<sup>2</sup>) of deck.

**Stainless Steel:** An alloy of steel which contains a high percentage of chromium. Also may contain nickel or copper. Has excellent resistance to corrosion.

**Standing Seam:** Watertight seam type featuring an upturned rib, which may also be structural. It is made by turning up the edges of two adjacent metal panels and then folding them over in one of a variety of ways.

**Susceptibility:** When not otherwise qualified, the degree of change in viscosity with temperature.

**Thermal Insulation:** A material designed to reduce the conductive heat flow.

**Thermoplastic Elastomers:** Polymers capable of remelt, but exhibiting elastomeric properties; related to elasticized polyolefins. They have a limited upper temperature service range.

**U-Factor:** The heat flow across an entire assembly; for example, from air within a building to outside air; the inverse of R-Factor. Also known as U-value.

**Uplift:** Wind load on a building which causes a load in the upward direction.

**Vapor Barrier:** See Vapor retarder.

**Vapor Pressure:** The pressure exerted by a vapor that is in equilibrium with its solid or liquid form.

**Vapor Retarder:** A material that resists the transmission of water vapor.

**Vent:** Opening designed to convey water vapor or other gas from inside a building or a building component to the atmosphere.

**Viscosity:** Index of a fluid's internal resistance to flow, measures in centistokes (cSt) for bitumens. (Water has a viscosity of roughly 1 cSt, light cooking oil 100 cSt.)

**Waterproofing:** Treatment of a surface or structure to prevent the passage of water under hydrostatic pressure.

## APPENDIX A UFC 3-110-03 REFERENCES

### GOVERNMENT

EO 13327, *Federal Real Property Asset Management*  
<https://federalregister.gov/presidential-documents/executive-orders>

29 CFR Part 1910, *Occupational Safety and Health Standards; Subpart D Walking-Working Surfaces and Subpart I Personal Protective Equipment*  
<https://www.ecfr.gov/current/title-29/subtitle-B/chapter-XVII/part-1910>

### DEPARTMENT OF DEFENSE

DoD Memorandum, *Standardizing Facility Condition Assessments*, 2013,  
[www.acq.osd.mil/eie/imr/mc/Downloads/DoD\\_Facility\\_Inspection\\_Policy.pdf](http://www.acq.osd.mil/eie/imr/mc/Downloads/DoD_Facility_Inspection_Policy.pdf)

### UNIFIED FACILITIES CRITERIA

[www.wbdg.org/dod/ufc](http://www.wbdg.org/dod/ufc)

UFC 1-200-01, *DoD Building Code*

UFC 1-200-02, *High Performance and Sustainable Building Requirements*

UFC 3-101-01, *Architecture*

UFC 3-301-01, *Structural Engineering*

UFC 3-420-01, *Plumbing Systems*

UFC 4-010-01, *DoD Minimum Antiterrorism Standards for Buildings*

UFC 4-010-06, *Cybersecurity of Facility-Related Control Systems*

UFC 4-211-01, *Aircraft Maintenance Hangars*

### UNIFIED FACILITIES GUIDE SPECIFICATIONS

[www.wbdg.org/dod/ufgs](http://www.wbdg.org/dod/ufgs)

UFGS 01 33 29, *Sustainability Requirements and Reporting*

UFGS 07 18 16, *Cold Liquid-Applied Reinforced Polymethyl Methacrylate (PMMA) Roofing*

UFGS 07 22 00, *Roof and Deck Insulation*

UFGS 07 31 13, *Asphalt Shingles*

UFGS 07 31 26, *Slate Shingles*

UFGS 07 32 13, *Concrete Tile Roofing Replacement or Repair*

UFGS 07 32 14, *Clay Tile Roofing Replacement or Repair*

UFGS 07 41 13, *Metal Roof Panels*

UFGS 07 41 13.16, *Copper Roof Panels*

UFGS 07 41 63, *Fabricated Roof Panel Assemblies*

UFGS 07 42 13, *Metal Wall Panels*

UFGS 07 42 63, *Fabricated Wall Panel Assemblies*

UFGS 07 51 13, *Built-Up Asphalt Roofing*

UFGS 07 52 00, *Modified Bituminous Membrane Roofing*

UFGS 07 53 23, *Ethylene Propylene Diene Monomer Roofing*

UFGS 07 54 19, *Polyvinyl Chloride (PVC) Roofing*

UFGS 07 54 23, *Thermoplastic Polyolefin (TPO) Roofing*

UFGS 07 55 00, *Protected Membrane Roofing (PMR)*

UFGS 07 56 00.60, *Mesh Reinforced Elastomeric Coating (MREC) Roofing*

UFGS 07 57 13, *Sprayed Polyurethane Foam (SPF) Roofing*

UFGS 07 60 00, *Flashing and Sheet Metal*

UFGS 07 61 14, *Steel Standing Seam Roofing*

UFGS 07 61 15, *Aluminum Standing Seam Roofing*

UFGS 07 62 13, *Copper Sheet Metal Flashing and Trim*

## **UNITED STATES ARMY**

CERL Report M85/05, *Sloped Roof Conversions for Small, Flat-Roofed Buildings*, (1985), Construction Engineering Research Laboratory (CERL) (order from NTIS: <https://discover.dtic.mil/>)

CRREL Report MP-01-5663, *Minimizing the Adverse Effects of Snow and Ice on Roofs*, Cold Regions Research and Engineering Laboratory (CRREL)  
[www.erd.usace.army.mil/Locations/CRREL/](http://www.erd.usace.army.mil/Locations/CRREL/)

CRREL MP 5106, *Attic Ventilation Guidelines to Minimize Icings at Eaves*, Cold Regions Research and Engineering Laboratory (CRREL) <https://discover.dtic.mil/>

CRREL MP 5420, *Ventilating Cathedral Ceilings to Prevent Problematic Icings at their Eaves*, Cold Regions Research and Engineering Laboratory (CRREL) <https://discover.dtic.mil/>

*Materials Selection Guide for Army Installations Exposed to Severely Corrosive Environments*, Construction Engineering Research Laboratory (CERL) (order from NTIS: <https://discover.dtic.mil/>)

EM 385-1-1, *Safety and Health Requirements Manual*

[www.usace.army.mil/Missions/Safety-and-Occupational-Health/Safety-and-Health-Requirements-Manual/](http://www.usace.army.mil/Missions/Safety-and-Occupational-Health/Safety-and-Health-Requirements-Manual/)

## **NON-GOVERNMENT**

### **AMERICAN SOCIETY FOR TESTING AND MATERIALS (ASTM)**

[www.astm.org/](http://www.astm.org/)

ASTM A153/A153M, *Standard Specification for Zinc Coating (Hot Dip) on Iron and Steel Hardware*

ASTM A653/A653M, *Standard Specification for Steel Sheet, Zinc Coated (Galvanized) or Zinc-Iron Alloy Coated (Galvannealed) by the Hot Dip Process*

ASTM C406/C406M, *Standard Specification for Roofing Slate*

ASTM C1289, *Standard Specification for Faced Rigid Cellular Polyisocyanurate Thermal Insulation Board*

ASTM D4263, *Standard Test Method for Indicating Moisture in Concrete by the Plastic Sheet Method*

ASTM D4541, *Standard Test Method for Pull-off Strength of Coatings Using Portable Adhesion Testers*

ASTM D4586/D4586M, *Standard Specification for Asphalt Roof Cement, Asbestos-Free*

ASTM D5957, *Standard Guide for Flood Testing Horizontal Waterproofing Installations*

ASTM E1592, *Standard Test Method for Structural Performance of Sheet Metal Roof and Siding Systems by Uniform Static Air Pressure Difference*

ASTM E2140, *Standard Test Method for Water Penetration of Metal Roof Panel Systems by Static Water Pressure Head*

ASTM F2170, *Standard Test Method for Determining Relative Humidity in Concrete Floor Slabs Using in situ Probes*

### **AMERICAN SOCIETY OF CIVIL ENGINEERS (ASCE)**

[www.asce.org](http://www.asce.org)

ASCE 7, *Minimum Design Loads and Associated Criteria for Buildings and other Structures*

### **AMERICAN SOCIETY OF HEATING, REFRIGERATING AND AIR-CONDITIONING ENGINEERS, INC., (ASHRAE)**

[www.ashrae.org/](http://www.ashrae.org/)

ASHRAE Standard 90.1, *Energy Standards for Buildings Except Low-Rise Residential*

## **AMERICAN SOCIETY OF SAFETY PROFESSIONALS (ASSP)**

[www.assp.org](http://www.assp.org)

ANSI/ASSP Z359, *Fall Protection & Fall Restraint*

ANSI/ASSP Z359.2, *Minimum Requirements for a Comprehensive Managed Fall Protection Program*

ANSI/ASSP A1264.1, *Safety Requirements for Workplace Walking/Working Surfaces and Their Access; Workplace, Floor, Wall and Roof Openings; Stairs and Guardrail/Handrail Systems*

## **FACTORY MUTUAL (FM)**

[www.fmglobal.com](http://www.fmglobal.com)

FM 4473, *Impact Resistance Testing of Rigid Roofing Materials by Impacting with Freezer Ice Balls*

FM 1-28, *Wind Design*

## **INTERNATIONAL CODE COUNCIL (ICC)**

[www.iccsafe.org](http://www.iccsafe.org)

IBC, *International Building Code*

IEBC, *International Existing Building Code*

IgCC, *International Green Construction Code*

## **METAL BUILDING MANUFACTURERS ASSOCIATION (MBMA)**

[www.mbma.com](http://www.mbma.com)

MBMA Roofing Manual, *Metal Roofing Systems Design Manual*

## **NATIONAL ROOFING CONTRACTORS ASSOCIATION (NRCA)**

[www.nrca.net](http://www.nrca.net)

NRCA Repair Manual for Low-Slope Membrane Roof Systems

NRCA Construction Details

NRCA Guidelines for Roof-mounted Photovoltaic Systems

NRCA Roofing Manual

NRCA Roofing and Waterproofing Manual

*NRCA Vegetative Roof Systems Manual*

**NATIONAL SLATE ASSOCIATION**

[slateassociation.org/](http://slateassociation.org/)

*Slate Roofs: Design and Installation Manual*

**SHEET METAL AND AIR CONDITIONING CONTRACTORS NATIONAL ASSOCIATION (SMACNA)**

[www.smacna.org](http://www.smacna.org)

*Architectural Sheet Metal Manual*

**SINGLE PLY ROOFING INDUSTRY (SPRI)**

[www.spri.org](http://www.spri.org)

*ANSI/SPRI ES-1, Test Standard for Edge Systems Used with Low-slope Roofing Systems*

*ANSI/SPRI FX-1, Standard Field Test Procedure for Determining the Withdrawal Resistance of Roofing Fasteners*

**SPRAY POLYURETHANE FOAM ALLIANCE**

[www.sprayfoam.org](http://www.sprayfoam.org)

*SPFA-127, Maintenance Manual for Spray Polyurethane Foam Roof Systems*

**UNDERWRITER'S LABORATORY**

[www.shopulstandards.com/](http://www.shopulstandards.com/)

*UL 1897, Standard for Uplift Tests for Roof Covering Systems*

*UL 2218, Impact Resistance of Prepared Roof Covering Materials/Standard Test Method for Determining Forming Limit Curves*

## APPENDIX A UFC 3-120-10 GLOSSARY

### A-1 ACRONYMS.

|         |  |
|---------|--|
| AE      | Architect/Engineer   |
| A/E/C   | Architecture/Engineering/Construction CAD Standard   |
| AFCEC   | Air Force Civil Engineer Center  |
| AFCFS   | Air Force Corporate Facilities Standards   |
| AFNAFPO | Air Force Non-Appropriated Funds Purchasing Office   |
| BIA     | Bilateral Infrastructure Agreement   |
| BPA     | Blanket Purchase Agreement   |
| BIM     | Building Information Modeling  |
| BOD     | Beneficial Occupancy Date  |
| BVD     | Best Value Determination   |
| CAD     | Computer-Aided Design  |
| CCD     | Construction Completion Date   |
| CCR     | Criteria Change Request  |
| CE      | Cost Engineering   |
| CFCI    | Contractor Furnished Contractor Installed  |
| CID     | Comprehensive Interior Design  |
| CIDA    | Council for Interior Design Accreditation  |
| DB      | Design-Build   |
| DBB     | Design-Bid-Build   |
| DD      | Department of Defense Forms Management Program is administered by the Directives Division (DD) of the Executive Services Directorate |
| DoD     | Department of Defense  |
| FAR     | Federal Acquisition Regulations  |
| FF&E    | Furniture, Fixtures and Equipment  |

|         |   |
|---------|---|
| FLC     | Fleet Logistics Command                               |
| FSC     | Federal Supply Category                               |
| FSRM    | Facilities Sustainment, Restoration and Modernization |
| FY      | Fiscal Year   |
| GFCI    | Government Furnished Contractor Installed             |
| GFGI    | Government Furnished Government Installed             |
| GSA     | General Services Administration                       |
| HNC     | U.S. Army Engineering and Support Center Huntsville   |
| HNFA    | Host Nation Funded Construction Agreements            |
| HVAC    | Heating, Ventilation and Air-Conditioning             |
| HQUSACE | Headquarters, U.S. Army Corps of Engineers            |
| M3      | Minimum Model Matrix                                  |
| MILCON  | Military Construction                                 |
| MPI     | Master Painter's Institute                            |
| NAF     | Non-Appropriated Funds                                |
| NASA    | National Aeronautics and Space Administration         |
| NAVFAC  | Naval Facilities Engineering Command                  |
| NFPA    | National Fire Protection Association                  |
| NCIDQ   | National Council for Interior Design Qualification    |
| O&M     | Operations and Maintenance                            |
| OMB     | Office of Management and Budget                       |
| OSHA    | Occupational Safety and Health Administration         |
| P&D     | Planning and Design                                   |
| POC     | Point of Contact                                      |
| POE     | Post Occupancy Evaluation                             |

|        |   |
|--------|---|
| PTS    | Performance Technical Specifications                |
| PxP    | Project Execution Plan                              |
| RFP    | Request for Proposal                                |
| SID    | Structural Interior Design                          |
| SIN    | Special Item Number                                 |
| SOFA   | Status of Forces Agreement                          |
| TPC    | Third Party Certification                           |
| UFC    | Unified Facilities Criteria                         |
| UFGS   | Unified Facilities Guide Specifications             |
| UNICOR | Federal Prison Industries, Inc. (also known as FPI) |
| U.S.   | United States                                       |
| VE     | Value Engineering                                   |
| WBDG   | Whole Building Design Guide                         |

## APPENDIX A UFC 3-120-10 REFERENCES

*Note: The most recent edition of referenced publication applies, unless otherwise specified.*

### **A/E/C CAD STANDARD**

<https://cadbimcenter.erdcdren.mil/default.aspx?p=a&i=7&t=1>

### **CAD BIM TECHNOLOGY CENTER**

<https://cadbimcenter.erdcdren.mil/default.aspx?p=a&t=1&i=14>

### **FF&E SOURCES OF SUPPLY**

*Ability One*, <https://www.abilityone.gov/>

*Federal Acquisition Regulations (FAR) PART 8*, <https://www.acquisition.gov/?q=browsefar>

*Federal Prison Industries, Inc. (UNICOR)*,  
[https://www.unicor.gov/Shopping/viewCat\\_m.asp?iStore=UNI](https://www.unicor.gov/Shopping/viewCat_m.asp?iStore=UNI)

GSA Advantage, <https://www.gsaadvantage.gov>

GSA Global Supply Catalog, <https://www.gsaglobalsupply.gsa.gov>

GSA Schedules,  
<https://www.gsaibrary.gsa.gov/ElibMain/ScheduleList%3bjsessionid=www.gsaibrary.gsa.gov-881f:403294b2:c56e211b4174c7c3>

### **MISCELLANEOUS**

AMS-STD-595, *Colors Used in Government Procurement*  
<https://ams-std-595-color.com/>

Master Painters Institute (MPI), *Architectural Painting Specification Manual*, [www.paintinfo.com](http://www.paintinfo.com)

*The RAL Colour Standard*, <https://www.ral-farben.de/en/>

### **NATIONAL FIRE PROTECTION ASSOCIATION (NFPA)**

NFPA 101, *Life Safety Code*, <https://www.nfpa.org/>

### **OCCUPATIONAL SAFETY AND HEALTH ADMINISTRATION (OSHA)**

<https://www.osha.gov>

### **UNIFIED FACILITIES CRITERIA**

<https://www.wbdg.org/dod/ufc>

UFC 1-200-01, *DoD Building Code (General Building Requirements)*

UFC 1-200-02, *High Performance and Sustainable Building Requirements*

UFC 1-300-02, *Unified Facilities Guide Specifications (UFGS) Format Standard*

UFC 3-101-01, *Architecture*

UFC 3-120-01, *Design: Sign Standards*

UFC 3-450-01, *Noise and Vibration Control*

UFC 3-530-01, *Design: Interior and Exterior Lighting Systems and Controls*

UFC 3-520-01, *Interior Electrical Systems*

UFC 3-580-01, *Information and Communications Technology Infrastructure Planning and Design*

UFC 3-600-01, *Design: Fire Protection Engineering for Facilities*

UFC 3-740-05, *Handbook: Construction Cost Estimating*

## **UNIFIED FACILITIES GUIDE SPECIFICATIONS (UFGS)**

<https://www.wbdg.org/dod/ufgs>

## **UNITED STATES DEPARTMENT OF THE AIR FORCE**

*Air Force Installation Facilities Standards (IFS)*, <https://www.wbdg.org/airforce/ifs>

## **UNITED STATES DEPARTMENT OF THE ARMY**

*USACE Standard FF&E Nomenclature*,

[https://rfpwizard.mrsi.ercd.dren.mil/MRSI/content/Furniture/furniture\\_home\\_page/Library/USACE%20Standard%20FFE%20Nomenclature\\_Feb%202024.pdf](https://rfpwizard.mrsi.ercd.dren.mil/MRSI/content/Furniture/furniture_home_page/Library/USACE%20Standard%20FFE%20Nomenclature_Feb%202024.pdf)

*HNC Centralized Furnishings Program – Ancillary Items Authorized for Procurement Matrix*,

[https://rfpwizard.mrsi.ercd.dren.mil/MRSI/content/Furniture/furniture\\_home\\_page/Library/HNC%20Centralized%20Furnishings%20Program%20-%20Ancillary%20Buys\\_Feb%202024.pdf](https://rfpwizard.mrsi.ercd.dren.mil/MRSI/content/Furniture/furniture_home_page/Library/HNC%20Centralized%20Furnishings%20Program%20-%20Ancillary%20Buys_Feb%202024.pdf)

*HNC Furnishings Program*, <https://mrsi.ercd.dren.mil/furniture/>

## **UNITED STATES DEPARTMENT OF THE NAVY**

*NAVFAC Building Information Management and Modeling (BIM) & Facility Electronic Operation and Maintenance Support Information (eOMSI) Program*, <https://www.wbdg.org/navy/bim-eomsi>

*NAVFAC Collateral Equipment (FF&E) Criteria & Templates*, <https://www.wbdg.org/navy/ffe-criteria-templates>

## **WHOLE BUILDING DESIGN GUIDE, A PROGRAM OF THE NATIONAL INSTITUTE OF BUILDING SCIENCES**

*Whole Building Design Guide*, <https://www.wbdg.org>

*Criteria Change Request*, <https://cms.wbdg.org/ccrs/new?ufc=3-120-10>

*Indoor Air Quality and Mold Prevention of the Building Envelope*  
<http://www.wbdg.org/resources/indoor-air-quality-and-mold-prevention-building-envelope>

*OMB Circular A131 Value Engineering*, [https://whitehouse.gov/wp-content/uploads/legacy\\_drupal\\_files/omb/circulars/A131/a131-122013.pdf](https://whitehouse.gov/wp-content/uploads/legacy_drupal_files/omb/circulars/A131/a131-122013.pdf)

*USD (AT&L) Memorandum*, [https://www.wbdg.org/FFC/DOD/ufc\\_implementation.pdf](https://www.wbdg.org/FFC/DOD/ufc_implementation.pdf)

## APPENDIX A UFC 3-190-06 GLOSSARY

### A-1 ACRONYMS

|         |   |
|---------|---|
| AFCEC   | Air Force Civil Engineer Center   |
| ASHRAE  | American Society of Heating, Refrigerating and Air-Conditioning Engineers |
| ASTM    | ASTM International  |
| BIA     | Bilateral Infrastructure Agreement  |
| CCR     | Criteria Change Request   |
| CCS     | Coating Condition Survey  |
| CQC     | Contractor Quality Control  |
| DoD     | Department of Defense   |
| EPA     | United States Environmental Protection Agency                             |
| ESC     | Environmental Severity Classification                                     |
| FAA     | Federal Aviation Administration   |
| HQUSACE | Headquarters, U.S. Army Corps of Engineers                                |
| HNFA    | Host Nation Funded Construction Agreements                                |
| L       | Liter   |
| MPa     | Megapascal  |
| MPI     | Master Painters Institute   |
| NACE    | NACE International – The Corrosion Society                                |
| NAVFAC  | Naval Facilities Engineering Systems Command                              |
| NAVSEA  | Naval Sea Systems Command   |
| NICAAP  | NACE International Institute Contractor Accreditation Program             |
| OSHA    | United States Occupational Safety and Health Administration               |
| PCCP    | SSPC Painting Contractor Certification Programs                           |
| PDS     | Product Data Sheet  |

|      |  |
|------|--|
| psi  | Pounds per square inch                     |
| SDS  | Safety Data Sheet                          |
| SOFA | Status of Forces Agreements                |
| SSPC | SSPC – The Society for Protective Coatings |
| TDS  | Technical Data Sheet                       |
| TSP  | Tri Sodium Phosphate                       |
| UFC  | Unified Facilities Criteria                |
| UFGS | Unified Facilities Guide Specification     |
| U.S. | United States                              |
| UV   | Ultraviolet                                |
| VOC  | Volatile Organic Compounds                 |

## A-2 DEFINITION OF TERMS

**Coating:** (1) A liquid, liquefiable, or mastic composition that is converted to a solid protective, decorative, or functional adherent film after application as a thin layer [ASTM D 16]; (2) Generic term for paint, lacquer, and enamel (from SSPC Glossary)

**Corrosion:** The deterioration of a material or its properties due to a reaction of that material with its chemical environment. (from 10 USC §2228(f))

**Corrosion prone locations:** Locations with one or more of the following characteristics (1) Exterior exposed metallic elements at a location with an ESC of C3, C4, or C5, (2) Exterior exposed nonmetallic elements at a location with an ESC of C4 or C5, (3) Locations where microenvironmental factors (for example, prevailing winds, ventilation, waterfront environments, industrial emissions, deicing salt application, possible chemical splash/spillage, adverse weather events such as flooding or wind-driven rain, and penetrations of the building envelope) may create a locally corrosive environment regardless of ESC, (4) Humid locations identified in ANSI/ASHRAE/IES 90.1 as climate zones 0A, 1A, 2A, 3A, 3C, 4C, and 5C, and (5) High humidity interior areas (for example, bathrooms, locker rooms, laundry rooms, pools, and trainers).

**Environmental Severity.** Describes the corrosivity of the local environment of a given location or region.

**Environmental Severity Classification (ESC):** A classification of geographical macro environments developed by DoD based on the International Standards Organization Corrosivity Classification Method. Additional details are available at <https://www.wbdg.org/ffc/dod/cpc-source/environmental-severity-classification>.

**Paint:** (1) Any pigmented liquid, liquefiable, or mastic composition designed for application to a substrate in a thin layer that is converted to an opaque solid film after application. Used for protection, decoration, identification, or to serve some other functional purposes; (2) Application of a coating material. (from SSPC Glossary)

## APPENDIX A UFC 3-190-06 REFERENCES

### ASHRAE

<https://www.ashrae.org/>

ANSI/ASHRAE/IES Standard 90.1: Energy Standard for Buildings Except Low-Rise Residential Buildings

### ASTM INTERNATIONAL

<https://www.astm.org/>

ASTM C881/C881M-20, *Standard Specification for Epoxy-Resin-Base Bonding Systems for Concrete*

ASTM D3274-09(2017), *Standard Test Method for Evaluating Degree of Surface Disfigurement of Paint Films by Fungal or Algal Growth, or Soil and Dirt Accumulation*

ASTM D4214-07(2015), *Standard Test Methods for Evaluating the Degree of Chalking of Exterior Paint Films*

ASTM D4258-05(2017), *Standard Practice for Surface Cleaning Concrete for Coating*

ASTM D4259-18, *Standard Practice for Preparation of Concrete by Abrasion Prior to Coating Application*

ASTM D4260-05(2017), *Standard Practice for Liquid and Gelled Acid Etching of Concrete*

ASTM D4261-05(2018), *Standard Practice for Surface Cleaning Concrete Masonry Units for Coating*

ASTM D4263-83(2018), *Standard Test Method for Indicating Moisture in Concrete by the Plastic Sheet Method*

ASTM F1869-16a, *Standard Test Method for Measuring Moisture Vapor Emission Rate of Concrete Subfloor Using Anhydrous Calcium Chloride*

### ENVIRONMENTAL PROTECTION AGENCY

<https://www.epa.gov/>

EPA 402-K-01-001, *Mold Remediation in Schools and Commercial Buildings*

## **FEDERAL AVIATION ADMINISTRATION**

<https://www.faa.gov/>

FAA Advisory Circular 70/7460-1L, *Obstruction Marking and Lighting*

## **NACE INTERNATIONAL**

<https://www.nace.org>

NACE SP0178, *Design, Fabrication, and Surface Finish Practices for Tanks and Vessels to Be Lined for Immersion Service*

*Joint SSPC/NACE standards are listed under the SSPC heading*

## **NAVSEA**

<https://www.navsea.navy.mil/>

NAVSEA Standard Item 009-32, *Cleaning and Painting Requirements; accomplish*

## **U.S. AIR FORCE**

Air Force Manual (AFMAN) 91-203, *Air Force Occupational Safety, Fire, and Health Standards*

## **U.S. ARMY**

EM 385-1-1, *Safety and Health Requirements*

## **SSPC – THE SOCIETY FOR PROTECTIVE COATINGS**

[www.sspc.org](http://www.sspc.org)

SSPC-ACS 1/NACE No. 13, *Industrial Coating and Lining Application Specialist Qualification and Certification*

SSPC-Guide 6, *Guide for Containing Surface Preparation Debris Generated during Paint Removal Operations*

SSPC-Guide 7, *Guide to the Disposal of Lead-Contaminated Surface Preparation Debris*

SSPC-Guide 11, *Protecting Edges, Crevices, and Irregular Steel Surfaces by Stripe Coating*

SSPC-SP 1, *Solvent Cleaning*

SSPC-SP 2, *Hand Tool Cleaning*

SSPC-SP 3, *Power Tool Cleaning*

SSPC-SP 5/NACE No. 1, *White Metal Blast Cleaning*

SSPC-SP 6/NACE No. 3, *Commercial Blast Cleaning*

SSPC-SP 7/NACE No. 4, *Brush-Off Blast Cleaning*

SSPC-SP 10/NACE No. 2, *Near White Metal Blast Cleaning*

SSPC-SP 11, *Power Tool Cleaning to Bare Metal*

SSPC-SP 13/NACE No. 6, *Surface Preparation of Concrete*

SSPC-SP 15, *Commercial Grade Power Tool Cleaning*

SSPC-SP 16, *Brush-Off Blast Cleaning of Coated and Uncoated Galvanized Steel, Stainless Steels, and Non-Ferrous Metals*

SSPC-SP 17, *Thorough Abrasive Blast Cleaning of Non-Ferrous Metals*

SSPC-SP WJ-1/NACE WJ-1, *Waterjet Cleaning of Metals -- Clean to Bare Substrate*

SSPC-SP WJ-2/NACE WJ-2, *Waterjet Cleaning of Metals -- Very Thorough Cleaning*

SSPC-SP WJ-3/NACE WJ-3, *Waterjet Cleaning of Metals -- Thorough Cleaning*

SSPC-SP WJ-4/NACE WJ-4, *Waterjet Cleaning of Metals -- Light Cleaning*

SSPC-SP 5 (WAB)/NACE WAB-1, *White Metal Wet Abrasive Blast Cleaning*

SSPC-SP 6 (WAB)/NACE WAB-3, *Commercial Wet Abrasive Blast Cleaning*

SSPC-SP 7 (WAB)/NACE WAB-4, *Brush-Off Wet Abrasive Blast Cleaning*

SSPC-SP 10 (WAB)/NACE WAB-2, *Near White Metal Wet Abrasive Blast Cleaning*

SSPC-SP CAB-1, *Thorough Blast Cleaning of Concrete*

SSPC-SP CAB-2, *Intermediate Blast Cleaning of Concrete*

SSPC-SP CAB-3, *Brush Blast Cleaning of Concrete*

SSPC-TU 3, *Overcoating: Existing Coatings Systems Applied to Steel Substrates*

SSPC-TU 6, *Chemical Stripping of Organic Coatings from Steel Structures*

## **UNIFIED FACILITIES CRITERIA**

<http://www.wbdg.org/ffc/dod/unified-facilities-criteria-ufc>

UFC 1-200-01, *DoD Building Code (General Building Requirements)*

UFC 1-200-02, *High Performance and Sustainable Building Requirements*

UFC 3-230-01, *Water Storage and Distribution*

UFC 3-460-01, *Design: Petroleum Fuel Facilities*

UFD 5-570-01, *Cathodic Protection*

## **UNIFIED FACILITIES GUIDE SPECIFICATIONS**

<https://www.wbdg.org/ffc/dod/unified-facilities-guide-specifications-ufgs>

UFGS 02 83 00, *Lead Remediation*

UFGS 09 90 00, *Paints and Coatings*

UFGS 09 96 00, *High-Performance Coatings*

UFGS 09 67 23.15, *Fuel Resistive Resinous Flooring, 3-Coat System*

UFGS 09 67 23.16, *Fuel Resistive Resinous Flooring, 5-Coat System*

UFGS 09 96 59, *High-Build Glaze Coatings*

UFGS 09 97 02, *Painting: Hydraulic Structures*

UFGS 09 97 13.00 40, *Steel Coatings*

UFGS 09 97 13.15, *Low VOC Polysulfide Interior Coating of Welded Steel Petroleum Fuel Tanks*

UFGS 09 97 13.16, *Interior Coating of Welded Steel Water Tanks*

UFGS 09 97 13.17, *Three Coat Epoxy Interior Coating of Welded Steel Petroleum Fuel Tanks*

UFGS 09 97 13.25, *Maintenance, Repair, and Coating of Tall Antenna Towers*

UFGS 09 97 13.26, *Coating of Steel Waterfront Structures, Zero VOC, (SZC) Splash Zone Coating*

UFGS 09 97 13.27, *Exterior Coating of Steel Structures*

UFGS 33 52 80, *Liquid Fuels Pipeline Coating Systems*

UFGS 32 17 23, *Pavement Markings*

## APPENDIX A UFC 3-201-01 GLOSSARY

### A-1 ACRONYMS.

|        |  |
|--------|--|
| AASHTO | American Association of State Highway and Transportation Officials |
| ACE    | Annual Chance Event  |
| ADT    | Average Daily Traffic  |
| AFCEC  | Air Force Civil Engineer Center                                    |
| AIROPS | Airfield Operations Bird/Animal Aircraft Strike Hazard             |
| AREMA  | American Railway Engineering and Maintenance-of-Way Association    |
| ASR    | Alkali-Silica Reaction   |
| AT&L   | Acquisition, Technology, and Logistics                             |
| AWWA   | AMERICAN WATER WORKS ASSOCIATION                                   |
| BASH   | Bird/Animal Aircraft Strike Hazard                                 |
| BFE    | Base Flood Elevation   |
| BIA    | Bilateral Infrastructure Agreement                                 |
| DFE    | Design Flood Elevation   |
| DoD    | Department of Defense  |
| DoR    | Designer of Record   |
| DOT    | Department of Transportation                                       |
| DRSL   | DoD Regional Sea Level   |
| EISA   | Energy Independence and Security Act                               |
| EO     | Executive Order  |
| EPA    | Environmental Protection Agency                                    |
| EWL    | Extreme Water Level  |
| FEMA   | Federal Emergency Management Agency                                |
| FIRM   | Flood Insurance Rate Map   |
| FIS    | Flood Insurance Study  |

|         |   |
|---------|---|
| HQUSACE | Headquarters, U.S. Army Corps of Engineers                                    |
| HNFA    | Host Nation Funded Construction Agreements                                    |
| IBC     | International Building Code   |
| IDF     | Intensity-Duration-Frequency  |
| LID     | Low Impact Development  |
| NAVFAC  | Naval Facilities Engineering Command  |
| NEPA    | National Environmental Policy Act   |
| NOAA    | National Oceanic and Atmospheric Administration                               |
| OEBGD   | Overseas Environmental Baseline Guidance Document                             |
| SDDCTEA | Surface Deployment and Distribution Command Transportation Engineering Agency |
| SOFA    | Status of Forces Agreements   |
| TR-55   | Technical Release 55  |
| UFC     | Unified Facilities Criteria   |
| UFGS    | Unified Facilities Guide Specifications                                       |
| U.S.    | United States   |
| WBDG    | Whole Building Design Guide   |

**DEFINITION OF TERMS.**

Climate-Informed Science Approach: The elevation and flood hazard area that result from using the best-available, actionable hydrologic and hydraulic data and methods that integrate current and future changes in flooding and tidally-influenced inundation based on climate science. This approach will also include an emphasis on whether the action is a critical action as one of the factors to be considered when conducting the analysis.

Non-Tidally Influenced Locations: Locations that are not subject to oceanic astronomical tidal influence.

Tidally Influenced Locations: Coastal and inland locations with oceanic astronomical tidal influence.

Use the following order of precedence for additional definitions:

1. The applicable legal definition.
2. The definitions provided in the applicable building code.
3. The definitions provided in the applicable standard.

## APPENDIX A UFC 3-201-01 REFERENCES

### A-1 FEDERAL GOVERNMENT.

#### CODE OF FEDERAL REGULATIONS

44 CFR Section 65.10, *Mapping of Areas Protected by Levee Systems*

#### EXECUTIVE ORDERS

EO 11988, *Floodplain Management* (May 24 1977), 42 FR 26951, 3 CFR, 1977

EO 11990, *Protection of Wetlands* (May 24 1977), 42 FR 26961, 3 CFR, 1977

EO 13690, *Establishing a Federal Flood Risk Management Standard and a Process for Further Soliciting and Considering Stakeholder Input* (January 30, 2015), 3 CFR, 2016

EO 14030, *Climate Related Financial Risk*, (May 20, 2021)

#### PUBLIC LAW

PL 115-232, Public Law 115-232, The National Defense Authorization Act for Fiscal Year 2019, Section 2805: Updates And Modifications To Department Of Defense Form 1391, Unified Facilities Criteria, And Military Installation Master Plans as amended by PL 116-92

PL 116-92, Public Law 116-92, The National Defense Authorization Act for Fiscal Year 2020, Section 2804 Amendment Of Unified Facilities Criteria To Promote Military Installation Resilience, Energy Resilience, Energy And Climate Resiliency, And Cyber Resilience

PL 117-81, Public Law 117-81, The National Defense Authorization Act for Fiscal Year 2022, Section 2805 Flood Risk Management For Military Construction

#### DEPARTMENT OF TRANSPORTATION

AC 150/5320-5, *Airport Drainage Design*<sup>1</sup>  
[https://www.faa.gov/regulations\\_policies/advisory\\_circulars/](https://www.faa.gov/regulations_policies/advisory_circulars/)

HDS-5, *Hydraulic Design of Highway Culverts*  
[https://www.fhwa.dot.gov/engineering/hydraulics/library\\_listing.cfm](https://www.fhwa.dot.gov/engineering/hydraulics/library_listing.cfm)

*Manual on Uniform Traffic Control Devices*  
<https://mutcd.fhwa.dot.gov/ser-pubs.htm>

SHSM, *Standard Highway Signs and Markings*

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<sup>1</sup> Requirement for Airfield Drainage criteria and Best Practice for storm drainage systems other than airfields

## **FEDERAL EMERGENCY MANAGEMENT AGENCY (FEMA)**

FEMA GD34, *Guidance for Flood Risk Analysis and Mapping*

<https://www.fema.gov/guidelines-and-standards-flood-risk-analysis-and-mapping>

## **NATIONAL OCEANIC AND ATMOSPHERIC ADMINISTRATION, FEDERAL GEODETIC CONTROL COMMITTEE**

*Standards and Specifications for Geodetic Control Networks*

[https://www.ngs.noaa.gov/FGCS/tech\\_pub/1984-stds-specs-geodetic-control-networks.pdf](https://www.ngs.noaa.gov/FGCS/tech_pub/1984-stds-specs-geodetic-control-networks.pdf)

## **DEPARTMENT OF DEFENSE**

DoDI 4715.05, *Overseas Environmental Baseline Guidance Document*

Regional Sea Level Database

Public: <https://drsl.serdp-estcp.org/Site>

FOUO: <https://sealevelscenarios.serdp-estcp.org>

DTM 22-003, Directive-type Memorandum (DTM) 22-003, "Flood Hazard Area Management for DoD Installations"

## **UNIFIED FACILITIES CRITERIA**

<https://www.wbdg.org/ffc/dod/unified-facilities-criteria-ufc>

Consult active UFCs for all aspects of design, including but not limited to:

UFC 1-200-01, *DoD Building Code*

UFC 2-100-01, *Installation Master Planning*

UFC 3-101-01, *Architecture*

UFC 3-210-10, *Low Impact Development*

UFC 3-220-01, *Geotechnical Engineering*

UFC 3-230-01, *Water Storage and Distribution*

UFC 3-230-03, *Water Treatment*

UFC 3-240-01, *Wastewater Collection and Treatment*

UFC 3-250-01, *Pavement Design for Roads and Parking Areas*

UFC 3-250-04, *Standard Practice for Concrete Pavements*

UFC 3-260-01, *Airfield and Heliport Planning and Design*

UFC 3-260-02, *Pavement Design for Airfields*

UFC 3-301-01, *Structural Engineering*

UFC 3-420-01, *Plumbing Systems*

UFC 3-460-01, *Design: Petroleum Fuel Facilities*

UFC 3-530-01, *Interior and Exterior Lighting Systems and Controls*

UFC 3-600-01, *Fire Protection Engineering for Facilities*

UFC 4-022-01, *Security Engineering: Entry Control Facilities/Access Control Points*

UFC 4-022-02, *Selection and Application of Vehicle Barriers*

UFC 4-152-01, *Design: Piers And Wharves*

UFC 4-860-01, *Railroad Design and Rehabilitation*

#### **U.S. ARMY CORPS OF ENGINEERS (HQUSACE)**

EM 1110-2-1913, *Design and Construction of Levees*

EM 1110-2-2104, *Strength Design for Reinforced-Concrete Hydraulic Structures*

EM 1110-2-2502, *Floodwalls and Other Hydraulic Retaining Walls*

EM 1110-1-1904, *Settlement Analysis*

EM 1110-2-2504, *Sheet Pile Walls*

ETL 1110-2-583, *Engineering and Design: Guidelines for Landscape Planting and Vegetation Management at Levees, Floodwalls, Embankment Dams, and Appurtenant Structures*

EM 1110-2-1619, *Risk-Based Analysis for Flood Damage Reduction Studies*

ER 1105-2-101, *Risk Assessment for Flood Risk Management Studies*

ER 1110-2-1150, *Engineering and Design for Civil Works Projects*

ETL 1110-2-299, *Overtopping of Flood Control Levees and Floodwalls*

#### **U.S. ARMY SURFACE DEPLOYMENT AND DISTRIBUTION COMMAND - TRANSPORTATION ENGINEERING AGENCY**

<https://www.sddc.army.mil/sites/TEA/Functions/SpecialAssistant/TrafficEngineeringBranch/Pages/pamphlets.aspx>

SDDCTEA Pamphlet 55-8, *Traffic Engineering Study Reference*

SDDCTEA Pamphlet 55-15, *Traffic and Safety Engineering for Better Entry Control Facilities*

SDDCTEA Pamphlet 55-17, *Better Military Traffic Engineering*

**U.S. DEPARTMENT OF AGRICULTURE - FOREST SERVICE**

USDA 0625 1808-SDTDC, *Low-Water Crossings: Geomorphic, Biological, and Engineering Design Considerations*

<https://www.fs.usda.gov/t-d/pubs/pdf/LowWaterCrossings/LoWholeDoc.pdf>

**U.S. DEPARTMENT OF AGRICULTURE - NATURAL RESOURCES  
CONSERVATION SERVICE**

TR-55, Technical Release 55, *Urban Hydrology for Small Watersheds*

**A-2 NON-GOVERNMENT.**

**AMERICAN ASSOCIATION OF STATE HIGHWAY AND TRANSPORTATION OFFICIALS**

<https://www.transportation.org/>

AASHTO GBF, *Guide for the Development of Bicycle Facilities*

AASHTO GDHS, *A Policy on Geometric Design of Highways and Streets*

AASHTO GPF, *Guide for the Planning, Design and Operation of Pedestrian Facilities*

AASHTO LRFDBDS, *LRFD Bridge Design Specifications*

AASHTO RSDG-4, *Roadside Design Guide*

AASHTO VLVLR, *Guidelines for Geometric Design of Very Low-Volume Local Roads (ADT ≤ 400)*

**AMERICAN CONCRETE INSTITUTE**

<https://www.concrete.org/>

ACI 522R, *Report on Pervious Concrete*

**AMERICAN RAILWAY ENGINEERING AND MAINTENANCE-OF-WAY ASSOCIATION (AREMA)**

<http://www.arema.org>

*Manual for Railway Engineering (Volumes 1 and 2)*

**AMERICAN SOCIETY FOR TESTING AND MATERIALS**

<https://www.astm.org/>

ASTM C76, *Standard Specification for Reinforced Concrete Culvert, Storm Drain, and Sewer Pipe*

ASTM C76M, *Standard Specification for Reinforced Concrete Culvert, Storm Drain, and Sewer Pipe (Metric)*

**AMERICAN SOCIETY OF CIVIL ENGINEERS**

<https://www.asce.org/>

ASCE 24-14, *Flood Resistant Design and Construction*

**AMERICAN WATER WORKS ASSOCIATION (AWWA)**

<https://www.awwa.org/>

AWWA M27, *External Corrosion for Infrastructure Sustainability*

**INNOVATIVE PAVEMENT RESEARCH FOUNDATION, AIRPORT CONCRETE PAVEMENT TECHNOLOGY PROGRAM**

<http://www.iprf.org>

ACPA Document No. JP007P, *Best Practices for Airport Portland Cement Concrete Pavement Construction*

**INTERLOCKING CONCRETE PAVEMENT INSTITUTE (ICPI)**

<https://www.icpi.org>

*Permeable Interlocking Concrete Pavements Manual - Design, Specification, Construction, Maintenance*

**INSTITUTE OF TRANSPORTATION ENGINEERS**

<https://www.ite.org/>

ITE LP-674B, *Highway Capacity Manual*

**INTERNATIONAL CODE COUNCIL**

<https://www.iccsafe.org/>

IBC, *International Building Code*

**NATIONAL SOCIETY OF PROFESSIONAL SURVEYORS**

<https://www.nsps.us.com/>

Model Standards for Topographic Surveys

**WATER ENVIRONMENT FEDERATION**

<https://www.wef.org/>

WEF MOP FD-4, *Design of Wastewater and Stormwater Pumping Stations*, 1993

WEF MOP FD-6, *Existing Sewer Evaluation and Rehabilitation*, Third Edition

**A-3 INDUSTRY PUBLICATIONS.**

*Pumping Station Design, 3<sup>rd</sup> Edition*, edited by Garr M. Jones with Robert L. Sanks, George Tchobanoglous, and Bayard Bosserman, Butterworth-Heinemann, 2008.

## APPENDIX A UFC 3-201-02 GLOSSARY

### A-1 ACRONYMS AND ABBREVIATIONS.

|                  |   |
|------------------|---|
| AASHTO           | American Association of State and Highway Transportation Officials    |
| ABA              | Architectural Barriers Act  |
| ADP              | Area Development Plan   |
| AHJ              | Authority Having Jurisdiction   |
| ANSI             | American National Standards Institute                                 |
| ASA IE&E<br>1V1/ | Assistant Secretary of the Army Installations, Energy and Environment |
| BASH             | Bird/Wildlife Aircraft Strike Hazard                                  |
| BIA              | Bilateral Infrastructure Agreement                                    |
| BoD              | Basis of Design   |
| CRM              | Cultural Resources Manager  |
| CRZ              | Critical Root Zone  |
| DBH              | Diameter at Breast Height   |
| DoDI             | DoD Instruction   |
| DoR              | Designer of Record  |
| EPA              | Environmental Protection Agency                                       |
| FGS              | Final Governing Standards   |
| HNFA             | Host Nation Funded Construction Agreements                            |
| IDGD             | Installation Design Guidance Documents                                |
| IDP              | Installation Development Plan   |
| IgCC             | International Green Construction Code                                 |
| INRMP            | Integrated Natural Resource Management Plan                           |
| IPM              | Integrated Pest Management  |
| IPS              | Installation Planning Standards                                       |

|           |   |
|-----------|---|
| LID       | Low Impact Development  |
| MILCON    | Military Construction   |
| NEPA      | National Environmental Policy Act   |
| NFPA      | National Fire Protection Association  |
| NHPA      | National Historic Preservation Act  |
| NHO       | Native Hawaiian Organization  |
| OASD EI&E | Office of Assistant Secretary of Defense for Energy, Installations, and Environment |
| O&M       | Operations and Maintenance  |
| PoR       | Program of Requirements   |
| POV       | Privately Owned Vehicle   |
| R         | Solar Reflectivity  |
| RFP       | Request for Proposals   |
| SAES      | Statement of Architectural and Engineering Services                                 |
| SOFA      | Status of Forces Agreements   |
| SoW       | Scope of Work   |
| SRI       | Solar Reflectance Index   |
| UFC       | Unified Facilities Criteria   |
| USDA      | United States Department of Agriculture   |
| WBDG      | Whole Building Design Guide   |

## A-2 DEFINITION OF TERMS

**Authority Having Jurisdiction (AHJ):** The component office of responsibility, i.e., U.S. Army, HQ USACE/CECW-CE; U.S. Navy, NAVFACENGCOM HQ Code CHE; U.S. Marine Corps, HQMC Code LFF-1; and U.S. Air Force, AFCEC. The enforcement of the codes and standards as they pertain to facility projects can be delegated to the local Components Office's Chief Engineer's Technical Representative at the discretion of the components aforementioned office.

**Bioremediation:** The treatment of pollutants or waste (as in an oil spill, contaminated groundwater, or an industrial process) by the use of microorganisms (such as bacteria) that break down the undesirable substances.

**Bird/Aircraft Strike Hazard (BASH):** The conflict between birds, airfields, and flight paths that poses safety issues for the flying environment. Problem species can be drawn away from active airfield areas by managing habitats on or near airfields, including enhancing habitat elsewhere.<sup>1</sup>

**Building:** "A roofed and floored facility enclosed by exterior walls and consisting of one or more levels that is suitable for single or multiple functions and that protects human beings and their properties from direct harsh effects of weather such as rain, wind, sun, etc."<sup>2</sup>

**Certified Seed:** "Certification is the process by which a state seed certifying agency gives official recognition to seeds produced of a cultivar or named variety under a limited generation system which ensures genetic purity, identity, and a given minimum level of quality. Progeny of breeder, foundation or registered seed, handled under procedures acceptable to the Department of Agriculture and Forestry to maintain satisfactory genetic purity and identity."<sup>3</sup>

**Charrette:** "An intensive creative work session in which a design team focuses on a design problem and arrives at a collaborative solution with stakeholders from the project area. A charrette can be a breakthrough event that helps create a meaningful master plan or facility design. Properly executed, this technique can produce a master plan or facility design that is more useful, better understood, and more quickly produced than one formed by any other method."<sup>4</sup>

**Complete streets:** Complete streets "are designed and operated to enable safe access for all users, including pedestrians, bicyclists, motorists, and transit riders of all ages and abilities."<sup>5</sup>

**Cultural landscape:** "Cultural landscapes are geographical areas (including both cultural and natural resources and the wildlife or domestic animals therein), associated with a historic event, activity or person or exhibiting other cultural or aesthetic values. There are primarily four types of cultural landscape: designed landscapes, ethnographic landscapes, historic sites, and vernacular landscapes."<sup>6</sup>

**Cultural resource (CR):** Per DoDI 4715.16:

- Historic properties (any prehistoric or historic district, site, building, structure, or object as defined by part 800 of Reference (k) included in, or eligible for inclusion in, the National Register of Historic Places, whether such eligibility has been formally determined), including artifacts, records, and material remains related to such a property or resource.
- Cultural items as defined in Reference (m).
- American Indian, Eskimo, Aleut, or Native Hawaiian sacred sites as defined in Reference (l).
- Archaeological resources as defined in section 470 aa-mm of Reference (x).
- Archaeological artifact collections and associated records as defined in part 79 of Reference (k).<sup>7</sup>

**Embodied energy:** The total energy required to manufacture or produce a material, transport it to a project site, and install it.

**Hardscape:** Inorganic or inanimate landscape elements, primarily referring to pavements and other non-vegetative materials used for paths and gathering areas.

**Integrated Cultural Resources Management Plan:** "A plan that defines the process for the management of cultural resources on DoD Installations."<sup>7</sup>

**Installation Design Guidance Documents (IDGD):** Installation-level plans and guidelines including, but not limited to the Installation Master Plan (IMP), Installation Development Plan (IDP), Area Development Plan (ADP), Base Exterior Architectural Plan (BEAP), and Installation Planning Standards (IPS), Air Force's Installation Facilities Standards (IFS), Army's Installation Design Guides (IDG), and Navy's Installation Appearance Plans (IAP).

**Landscape area:** Pervious area with landscape improvements that is not covered by built improvements and impervious surfaces (including buildings, other structures, or paved surfaces such as including parking areas and walkways).

**Large tree:** Type 1 and 2 shade trees as classified by the *American Standard for Nursery Stock* (ANSI Z60.1).

**Lawn:** A managed grass space.

**Native plant:** A species that is endemic to a geographic or ecological region, or a cultivar of that species.

**Landscape establishment period:** A period lasting a minimum of 365 days from final acceptance of project, during which plant material is irrigated and observed for viability. The irrigation system, if used is maintained and repaired as needed. This period may be adjusted by the Reviewing Government Landscape Architect. Runs concurrently with *landscape warranty period*.

**Landscape warranty period:** A period lasting a minimum of 365 days from final acceptance of project, during which plant material must meet 95% survival rate and the irrigation system is in good working order. Runs concurrently with *landscape establishment period*.

**Phytoremediation:** the treatment of pollutants or waste (as in contaminated soil or groundwater) by the use of green plants that remove, degrade, or stabilize the undesirable substances (such as toxic metals).

**Resiliency:** The capacity to anticipate, prepare for, respond to, recover from, and adapt to hazards and the risks they pose, including severe weather events and the effects of climate change.

**Site commissioning:** “Site Commissioning is a systematic process of verifying that systems within the built environment, beyond a building’s skin, perform in accordance with design intent and the property owner’s operational needs.”<sup>8</sup>

**Site furnishings:** Functional and aesthetic amenities that enhance a site for human comfort.

**Site improvements:** All site modification that will result in permanent paving features or landforms. Does not refer to enclosed buildings or airfield pavements.

**Small Tree:** Type 3 small upright trees and Type 4 small spreading trees as classified by the *American Standard for Nursery Stock* (ANSI Z60.1).

**Turf:** The upper stratum of soil bound by grass and plant roots into a thick mat.

**Viewshed:** The natural environment that is visible from one or more viewing points

**Xeriscaping:** Xeriscaping is landscaping and gardening that reduces or eliminates the need for supplemental water from irrigation. This term was coined by Denver Water in 1981 and is associated with seven design principles elaborated on at utility’s website: <https://www.denverwater.org/residential/rebates-and-conservation-tips/remodel-your-yard/xeriscape-plans/xeriscape-principles>

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<sup>7</sup> DoDI 4715.16, “Cultural Resources Management,” 18 September 2008, <http://www.esd.whs.mil/Portals/54/Documents/DD/issuances/dodi/471516p.pdf?ver=2017-11-21-114100-670>

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## APPENDIX A UFC 3-201-02 REFERENCES

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## APPENDIX A UFC 3-210-10 GLOSSARY

### A-1 ACRONYMS.

|                |  |
|----------------|--|
| ARC            | Antecedent Runoff Condition                                  |
| Bio            | Biological   |
| BMP            | Best Management Practice                                     |
| CN             | Curve Number   |
| CWA            | Clean Water Act  |
| DoD            | Department of Defense  |
| DoDAAC         | Department of Defense Activity Address Code                  |
| EISA           | Energy Independence and Security Act                         |
| EPA            | United States Environmental Protection Agency                |
| GHCN           | Global Historical Climate Network                            |
| GSOD           | Global Summary of the Day                                    |
| HN             | Host Nations   |
| HSG            | Hydrologic Soil Group  |
| I <sub>a</sub> | Initial Abstraction  |
| IMP            | Integrated Management Practice                               |
| LID            | Low Impact Development                                       |
| NCEI           | National Centers for Environmental Information               |
| NEH            | National Engineering Handbook of Hydrology                   |
| NPDES          | National Pollutant Discharge Elimination System              |
| NOAA           | National Oceanic and Atmospheric Administration              |
| NRCS           | USDA Natural Resources Conservation Service (formerly SCS)   |
| O&M            | Operations and Maintenance                                   |
| OMSI           | Operation and Maintenance Support Information                |
| PGDER          | Prince George's County Department of Environmental Resources |

|                |   |
|----------------|---|
| SCS            | USDA Soil Conservation Service          |
| SWM            | Stormwater Management                   |
| T <sub>c</sub> | Time of Concentration                   |
| TR-55          | NRCS Technical Release 55               |
| UFC            | Unified Facilities Criteria             |
| USDA           | United States Department of Agriculture |
| WMO            | World Meteorological Organization       |

**95th Percentile Rainfall Event:** The 95th percentile rainfall event represents a precipitation amount which 95 percent of all rainfall events for the period of record do not exceed. In more technical terms, the 95th percentile rainfall event is defined as the measured precipitation depth accumulated over a 24-hour period for the period of record that ranks as the 95th percentile rainfall depth based on the range of all daily event occurrences during this period.

The 24-hour period is typically defined as 12:00:00 am to 11:59:59 pm. In general, a 30-year period of rainfall data is recommended for such an analysis, with a required minimum period of 10 years. Small rainfall events that are 0.1 inch or less (that is,  $\leq 0.1$  inches) are excluded from the percentile analysis because this rainfall generally does not result in any measurable runoff due to absorption, interception, and evaporation by permeable, impermeable, and vegetated surfaces.

**Building:** DODI 4165.14, Enclosure 2, defines a building as: A roofed and floored facility enclosed by exterior walls and consisting of one or more levels that is suitable for single or multiple functions and that protects human beings and their properties from direct harsh effects of weather such as rain, wind, sun, etc.

**Federal Facility:** Section 401(8) of EISA states: The term "Federal facility" means any building that is constructed, renovated, leased, or purchased in part or in whole for use by the Federal Government.

**Low Impact Development (LID):** LID is a stormwater management strategy designed to maintain site hydrology and mitigate the adverse impacts of stormwater runoff and nonpoint source pollution.

LID actively manages stormwater runoff by mimicking a project site's pre-development hydrology using design techniques that infiltrate, store, and evaporate runoff close to its source of origin. LID strategies provide decentralized hydrologic source control for stormwater runoff. In short, LID seeks to manage the rain, beginning at the point where it falls. The LID features are distributed small-scale controls that closely mimic the hydrological behavior of the pre-project sites for a design storm event.

**Pre-Development:** pre-project conditions that exist at the beginning of design. Where phased development occurs, the existing conditions at the time prior to the first phase being submitted will establish pre-development conditions.

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UFC 4-010-06, *DoD Cybersecurity Of Facility-Related Control Systems*

## APPENDIX A UFC 3-220-01 GLOSSARY

### A-1 ACRONYMS.

|         |   |
|---------|---|
| AFCEC   | Air Force Civil Engineering Center  |
| BIA     | Bilateral Infrastructure Agreement  |
| DoD     | Department of Defense   |
| DoR     | Designer of Record – The responsible designer whose seal is placed on the design documents (Navy, Marine Corps) |
| EoR     | Engineer of Record – Same as DoR (Army, Air Force)  |
| ft      | foot  |
| HQUSACE | Headquarters, U.S. Army Corps of Engineers  |
| HNFA    | Host Nation Funded Construction Agreements  |
| NAVFAC  | Naval Facilities Engineering Systems Command  |
| SOFA    | Status of Forces Agreements   |
| sq m    | square meter  |
| sf      | square foot   |
| UFC     | Unified Facilities Criteria   |
| U.S.    | United States   |
| USACE   | United States Army Corps of Engineers   |

## **APPENDIX A UFC 3-220-01 REFERENCES**

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## **INTERNATIONAL CODE COUNCIL**

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## **UNIFIED FACILITIES CRITERIA**

<https://www.wbdg.org/dod/ufc>

UFC 1-200-01, DoD Building Code

FC 1-300-09N, Navy and Marine Corps Design Procedures

UFC 3-220-05, Dewatering and Groundwater Control

UFC 3-220-08FA, Engineering Use of Geotextiles

UFC 3-220-10, Soil Mechanics (DM 7.1)

UFC 3-220-20, Foundations and Earth Structures (DM 7.2)

UFC 3-260-01, Airfield and Heliport Planning and Design

UFC 3-301-01, Structural Engineering

## **U.S. ARMY CORPS OF ENGINEERS**

<https://www.publications.usace.army.mil/>

EM 1110-1-1804, Geotechnical Investigations

EM 1110-2-1902, Slope Stability

## **VESIC, A.S.**

*Ultimate Loads and Settlements of Deep Foundations in Sand*, Proc., Symposium on Bearing Capacity and Settlement of Foundations, Duke University, Durham, N.C. 1967, p. 53

## **APPENDIX B UFC 3-220-01 SUPPLEMENTAL RESOURCES**

### **INTRODUCTION**

The following references are reliable sources for information related to geotechnical engineering and design. These sources provide direction for specific geotechnical applications not addressed in this UFC or provide additional information to guide or aid the designer in the various phases of the design. This list is provided for the convenience of the designer and may not include references for all specific applications relevant to all projects. The designer is responsible for insuring the design conforms to all criteria relevant to the project.

### **UNIFIED FACILITIES CRITERIA**

<https://www.wbdg.org/dod/ufc>

UFC 3-220-06, GROUTING METHODS AND EQUIPMENT

UFC 3-250-11, SOIL STABILIZATION FOR PAVEMENTS

### **ARMY CORPS OF ENGINEERS PUBLICATIONS**

<https://www.publications.usace.army.mil/>

USACE EM 1110-2-2300 Engineering and Design: GENERAL DESIGN AND CONSTRUCTION CONSIDERATIONS FOR EARTH AND ROCK-FILL DAMS

USACE EM 1110-3-136 Engineering and Design: DRAINAGE AND EROSION CONTROL-MOBILIZATION CONSTRUCTION

USACE EM 1110-3-137 Engineering and Design: SOIL STABILIZATION FOR PAVEMENTS-MOBILIZATION CONSTRUCTION

USACE ER 1110-1-261 Engineering and Design: QUALITY ASSURANCE OF LABORATORY TESTING PROCEDURES

USACE ETL 1110-1-138 Engineering and Design: STANDARD PENETRATION TEST

USACE ETL 1110-1-185 Engineering and Design: GUIDELINES ON GROUND IMPROVEMENT FOR STRUCTURES

USACE ETL 1110-2-282 Engineering and Design: ROCK MASS CLASSIFICATION DATA REQUIREMENT FOR RIPPABILITY

## **NON-GOVERNMENT INDUSTRY PUBLICATIONS**

ADSC: The International Association of Foundation Drilling, 8445 Freeport Parkway, Suite 325, Irving, TX 75063, Telephone: 469-359-6000, Website: <https://www.adsc-iafd.com/>

Caterpillar Tractor Company, Handbook of Ripping, 8th Edition, Peoria, IL

Cambridge University Press, The Edinburgh Building, Cambridge, CB2 8RU, UK Rock Mechanics and Engineering, by C. Jaeger

Center for Geotechnical Research, Virginia Tech, Blacksburg, VA 24061, Website: <https://cgpr.cee.vt.edu/>

Deep Foundations Institute, 326 Lafayette Avenue, Hawthorne, NJ 07506 Telephone: 973-423-4030, Website: <https://dfi.org/>

Elsevier Publications, The Boulevard, Langford Land, Kidlington Oxford, Engineering Rock Mechanics (Pt. 1, 2) by J.A. Hudson, J.P. Harrison

Geosynthetics Specifiers Guide, Geosynthetics Magazine, Geosynthetic Materials Association, 1801 County Road B, West, Roseville, MN 55113, Telephone: 651-222-2508, Website: <https://geosyntheticsmagazine.com/>

The Geotechnical and Geoenvironmental Software Directory, Website <http://www.ggsd.com/>

ISEE Blasters' Handbook, International Society of Explosive Engineers, 30325 Bainbridge Road, Cleveland, OH 44139, Telephone: 440-349-4400, Website: <https://www.isee.org/>

Pile Buck, Inc., P.O. Box 64-3929 Vero Beach, FL 32964, Telephone: 772-492-1056, Website: <https://pilebuck.com/>

Transportation Research Board, NCHRP Program Report VOL. 343, Engineering Manual for Shallow Foundations, Driven Piles, Drilled Shafts, Retaining Walls, and Abutments, Website: <https://trid.trb.org/View/364307#>

## APPENDIX A UFC 3-230-01 GLOSSARY

### A-1 ACRONYMS.

|         |   |
|---------|---|
| AFCEC   | Air Force Civil Engineering Center                    |
| AT&L    | Acquisition, Technology, and Logistics                |
| AWWA    | American Water Works Association                      |
| B&S     | Bell & Spigot   |
| BIA     | Bilateral Infrastructure Agreement                    |
| CCB     | Construction Criteria Base                            |
| DDC     | Direct Digital Controls                               |
| DoD     | Department of Defense                                 |
| DoR     | Designer of Record                                    |
| e.g.    | <i>Exempli Gratia</i> (one or more possible examples) |
| EPA     | Environmental Protection Agency                       |
| FAA     | Federal Aviation Administration                       |
| FGS     | Final Governing Standards                             |
| fPVC    | Fusible Polyvinyl Chloride                            |
| HQUSACE | Headquarters, U.S. Army Corps of Engineers            |
| HNFA    | Host Nation Funded Construction Agreements            |
| i.e.    | <i>Id Est</i> (clarifies, more precisely)             |
| IPC     | International Plumbing Code                           |
| NASA    | National Aeronautics and Space Administration         |
| NAVAIR  | Naval Air Systems Command                             |
| NAVFAC  | Naval Facilities Engineering Command                  |
| NEMA    | National Electrical Manufacturers Association         |
| NEPA    | National Environmental Policy Act                     |
| OEBGD   | Overseas Environmental Baseline Guidance Document     |

|      |   |
|------|---|
| ORP  | Oxidation Reduction Potential                 |
| OSHA | Occupational Safety and Health Administration |
| PE   | Polyethylene                                  |
| PVC  | Polyvinyl Chloride                            |
| SOFA | Status of Forces Agreements                   |
| UFC  | Unified Facilities Criteria                   |
| UFGS | Unified Facilities Guide Specifications       |
| U.S. | United States                                 |
| WBDG | Whole Building Design Guide                   |

## **A-2            DEFINITION OF TERMS.**

**Distribution Mains:** All pipelines of the potable water distribution system, except the service lines (e.g., water, fire, irrigation).

**Pipe Size:** The nominal internal diameter of the pipe.

**Surge pressure:** The maximum hydraulic transient pressure increase (also known as water hammer) above the anticipated operating pressure in the system as the result of sudden changes in velocity of the water column. Two types of surge pressures are recurring (cyclic) surge pressure and occasional (emergency or transient) surge pressure.

**Working pressure:** The maximum sustained operating pressure applied to the pipe exclusive of surge pressures.

For additional definitions refer to the definitions given in the applicable standard.

## APPENDIX A UFC 3-230-01 REFERENCES

### AMERICAN SOCIETY OF SAFETY PROFESSIONALS

<http://www.assp.org/>

ASSE Z590.3, *Prevention Through Design, Guidelines for Addressing Occupational Hazards and Risks in Design and Redesign Processes*

### AMERICAN WATER WORKS ASSOCIATION

<http://www.awwa.org>

AWWA M6, *Water Meters - Selection, Installation, Testing, and Maintenance*

AWWA M14, *Backflow Prevention and Cross-Connection Control Recommended Practices*

AWWA M19, *Emergency Planning for Water Utilities*

AWWA M22, *Sizing Water Service Lines and Meters*

AWWA M27, *External Corrosion Control for Infrastructure Sustainability*

AWWA M31, *Distribution Systems Requirements for Fire Protection*

AWWA M32, *Computer Modeling of Water Distribution Systems*

AWWA M42, *Steel Water Storage Tanks*

AWWA M51, *Air-Valves: Air-Release, Air/Vacuum and Combination*

AWWA M55, *PE Pipe - Design and Installation*

AWWA M58, *Internal Corrosion Control of Water Distribution Systems*

AWWA C510, *Double Check-Valve Backflow Prevention Assembly*

AWWA C511, *Reduced-Pressure Principle Backflow Prevention Assembly*

AWWA C651, *Disinfecting Water Mains*

AWWA C652, *Disinfection of Water-Storage Facilities*

AWWA C800, *Underground Service Line Valves and Fittings*

AWWA D100, *Welded Carbon Steel Tanks for Water Storage*

AWWA D102, *Coating Steel Water-Storage Tanks*

AWWA D103, *Factory-Coated Bolted Carbon Steel Tanks for Water Storage*

AWWA D104, *Automatically Controlled, Impressed Current Cathodic Protection for the Interior Submerged Surfaces of Steel Water Tanks*

AWWA D106, *Sacrificial Anode Cathodic Protection Systems for the Interior Submerged Surfaces of Steel Water Storage Tanks*

AWWA D107, *Composite Elevated Tanks for Water Storage*

AWWA D110, *Wire- and Strand-Wound, Circular, Prestressed Concrete Water Tanks*

AWWA D115, *Circular Prestressed Concrete Water Tanks*

### **COMMANDER, NAVY INSTALLATIONS COMMAND (NAVY ONLY)**

<https://cnic.navy.mil/about/cnic-instructions.html>

CNICINST 5090.1B, CNIC Instruction 5090.1B, Navy Overseas Drinking Water Program Ashore

### **DEPARTMENT OF DEFENSE (DOD)**

DoD 4715.05-G, *Overseas Environmental Baseline Guidance Document*,  
<http://www.dtic.mil/whs/directives/corres/pdf/471505g.pdf>

DoDI 6055.01, *DoD Safety and Occupational Health (SOH) Program*,  
<http://www.dtic.mil/whs/directives/corres/pdf/605501p.pdf>

### **DEPARTMENT OF DEFENSE (DOD), UNIFIED FACILITIES CRITERIA (UFC)**

<http://dod.wbdg.org/>

UFC 1-200-01, DoD Building Code

UFC 1-200-02, *High Performance and Sustainable Building Requirements*

UFC 3-201-01, *Civil Engineering*

UFC 3-230-03, *Water Treatment*

UFC 3-240-01, *Wastewater Collection and Treatment*

UFC 3-220-01, *Geotechnical Engineering*

UFC 3-260-01, *Airfield and Heliport Planning and Design*

UFC 3-301-01, *Structural Engineering*

UFC 3-410-01, *Heating, Ventilating, And Air Conditioning Systems*

UFC 3-420-01, *Plumbing Systems*

UFC 3-520-01, *Interior Electrical Systems*

UFC 3-535-01, *Visual Air Navigation Facilities*

UFC 3-570-01, *Cathodic Protection*

UFC 3-600-01, *Fire Protection Engineering for Facilities*

UFC 4-010-06, *Cybersecurity of Facility-Related Control Systems*

UFC 4-150-02, *Dockside Utilities for Ship Service*

UFC 4-213-12, *Drydocking Facilities Characteristics*

**DEPARTMENT OF DEFENSE (DOD), UNIFIED FACILITIES GUIDE  
SPECIFICATIONS (UFGS)**

<http://dod.wbdg.org/>

UFGS 33 11 00, *Water Utility Distribution Piping*

**EXECUTIVE ORDER**

Executive Order 13693, *Planning for Federal Sustainability in the Next Decade*, March 19, 2015

**GREAT LAKES – UPPER MISSISSIPPI RIVER BOARD OF STATE AND  
PROVINCIAL PUBLIC HEALTH AND ENVIRONMENTAL MANAGERS**

<http://10statesstandards.com/>

Recommended Standards for Water Works, Policies for the Review and Approval of Plans and Specifications for Public Water Supplies, A Report of the Water Supply Committee of the Great Lakes--Upper Mississippi River Board of State and Provincial Public Health and Environmental Managers

**INTERNATIONAL CODE COUNCIL**

<http://www.iccsafe.org>

IPC, International Plumbing Code 2018

**NATIONAL ELECTRICAL MANUFACTURERS ASSOCIATION (NEMA)**

<http://www.nema.org>

NEMA MG1, *Motors and Generators*

NEMA MG2, Safety Standard and Guide for Selection, Installation, and Use of Electric Motors and Generators

**NATIONAL FIRE PROTECTION ASSOCIATION**

<http://www.nfpa.org>

NFPA 24, Standard for the Installation of Private Fire Service Mains and Their Appurtenances

**NAVAL AIR SYSTEMS COMMAND**

NAVAIR 51-50AAA-2, *General Requirements for Shorebased Airfield Marking and Lighting*

**NSF INTERNATIONAL**

<http://www.nsf.org>

NSF 61, *Drinking Water System Components – Health Effects*

**PLASTIC PIPE INSTITUTE**

<http://plasticpipe.org>

TN-44 2015, *Long Term Resistance of AWWA C906 Polyethylene (PE) Pipe to Potable Water Disinfectants*

## APPENDIX A UFC 3-240-01 GLOSSARY

### A-1 ACRONYMS.

|         |   |
|---------|---|
| AFCEC   | Air Force Civil Engineering Center                |
| AHJ     | Authority Having Jurisdiction                     |
| ASCE    | American Society of Civil Engineers               |
| ASTM    | American Society for Testing and Materials        |
| BEQ     | Bachelor Enlisted Quarters                        |
| BIA     | Bilateral Infrastructure Agreements               |
| BOD     | Biochemical Oxygen Demand                         |
| BOQ     | Bachelor Officer Quarters                         |
| COD     | Chemical Oxygen Demand                            |
| DAF     | Dissolved Air Flotation                           |
| DoD     | Department of Defense                             |
| DoR     | Designer of Record                                |
| FGS     | Final Governing Standards                         |
| HQUSACE | Headquarters, U.S. Army Corps of Engineers        |
| HNFA    | Host Nation Funded Construction Agreements        |
| IPC     | International Plumbing Code                       |
| IPSDC   | International Private Sewage Disposal Code        |
| LET     | Load Equalization Tank                            |
| NAVFAC  | Naval Facilities Engineering Command              |
| NPDES   | National Pollution Discharge Elimination System   |
| MOP     | Manual of Practice                                |
| OEBGD   | Overseas Environmental Baseline Guidance Document |
| OSHA    | Occupational Safety and Health Administration     |
| OWHT    | Oily Waste Holding Tanks                          |

|      |   |
|------|---|
| OWTP | Oily Waste Transfer Pumps               |
| OWWO | Oily waste and Waste Oil                |
| O&G  | Oil and Grease                          |
| POTW | Public Owned Treatment Works            |
| RBC  | Rotating Biological Contactors          |
| RBP  | Rapid Bioassay Procedures               |
| RMF  | Risk Management Framework               |
| SBR  | Sequencing Batch Reactor                |
| SOFA | Status of Forces Agreements             |
| TSS  | Total Suspended Solids                  |
| UFC  | Unified Facilities Criteria             |
| UFGS | Unified Facilities Guide Specifications |
| U.S. | United States                           |
| VSS  | Volatile Suspended Solids               |
| WEF  | Water Environment Federation            |
| WET  | Whole Effluent Toxicity                 |
| WOT  | Waste Oil Tanks                         |
| WRRF | Water Resource and Recovery Facility    |

## APPENDIX A UFC 3-240-01 REFERENCES

### GOVERNMENT PUBLICATIONS:

#### CODE OF FEDERAL REGULATIONS

29 CFR 1910.24(b) *Manhole Steps*

29 CFR 1910.23(d) *Fixed Ladders*

33 CFR 154.530 - *Small discharge containment*

40 CFR Subchapter N – *Effluent Guidelines and Standards*

40 CFR 112 - *Oil Pollution Prevention*

40 CFR 122 - *EPA Administered Permit Programs: The National Pollutant Discharge Elimination System*

40 CFR 136 – *Guidelines for Establishing Test Procedures for the Analysis of Pollutants*

40 CFR 257 - *Criteria for Classification of Solid Waste Disposal Facilities and Practices*

40 CFR 261 – *Identification and Listing of Hazardous Waste*

40 CFR 401.15 – *Toxic pollutants*

40 CFR 401.16 - *Conventional pollutants*

40 CFR 403 – *General Pretreatment Regulations for Existing and New Sources of Pollution*

40 CFR 423, Appendix A to Part 423 - 126 – *Priority Pollutants*

#### DEPARTMENT OF DEFENSE

DoD 4715.05-G, *Overseas Environmental Baseline Guidance Document*

DODINST 6055.01, *DoD Safety and Occupational Health (SOH) Program*

#### UNIFIED FACILITIES CRITERIA

<http://dod.wbdg.org/>

UFC 1-200-01, *DoD Building Code*

UFC 1-200-02, *High Performance and Sustainable Building Requirements*

FC 1-300-09N, *Navy and Marine Corp Design Procedures*

UFC 3-201-01, *Civil Engineering*

UFC 3-230-01, *Water Storage and Distribution*

UFC 3-240-03, *Operation and Maintenance (O&M): Wastewater Treatment*

UFC 3-301-01, *Structural Engineering*

UFC 3-420-01, *Plumbing Systems*

UFC 3-460-01, *Petroleum Fuel Facilities*

UFC 3-570-01, *Cathodic Protection*

UFC 3-600-01, *Fire Protection Engineering for Facilities*

UFC 4-010-06, *Cybersecurity of Facility Related Control Systems*

UFC 4-020-01, *DoD Security Engineering Facilities Planning Manual*

UFC 4-150-02, *Dockside Utilities for Ship Service*

UFC 4-152-01, *Design: Piers And Wharves*

UFC 4-211-01, *Aircraft Maintenance Hangars*

#### **NON-GOVERNMENT PUBLICATIONS:**

##### **AMERICAN SOCIETY OF CIVIL ENGINEERS**

ASCE MOP 60, *Gravity Sanitary Sewer Design and Construction*, a joint publication with WEF (WEF MOP FD-5)

##### **AMERICAN NATIONAL STANDARDS INSTITUTE**

ANSI A14.3 *American National Standard for Ladders – Fixed – Safety Requirements*

ANSI Z358.1, *Standard for Emergency Eyewash and Shower Stations*

##### **AMERICAN WATER WORKS ASSOCIATION**

AWWA C150/ANSI A21.50, *Thickness Design of Ductile Iron Pipe*

##### **DUCTILE IRON PIPE RESEARCH ASSOCIATION**

DIPRA, *Thrust Restraint Design for Ductile Iron Pipe*, latest edition

##### **GREAT LAKES – UPPER MISSISSIPPI RIVER BOARD OF STATE PUBLIC HEALTH AND ENVIRONMENTAL MANAGERS**

10 State Standards, *Recommended Standards for Wastewater Facilities*, 2014

##### **INTERNATIONAL CODE COUNCIL**

IPC, International Plumbing Code, (same version as International Plumbing Code as required by UFC 3-420-01)

IPSDC, *International Private Sewage Disposal Code*, (same version as International Plumbing Code as required by UFC 3-420-01)

Manufacturers Standardization Society of the Valve and Fittings Industry, Inc., 127 Park Street, NE, Vienna, Virginia 22180-4602

MSS SP-58-2018, Pipe Hangers and Supports, Materials, Design, Manufacture, Selection, Application, and Installation

## **WATER ENVIRONMENT FEDERATION**

WEF MOP FD-3, *Industrial Wastewater Management, Treatment, and Disposal, third edition*

## APPENDIX A UFC 3-301-01 GLOSSARY

**A-1**

### **ABBREVIATIONS.**

|               |  |
|---------------|--|
| <b>g</b>      | Gravitational Acceleration   |
| <b>µm</b>     | Micrometer (micron)  |
| <b>3-D</b>    | Three Dimensional  |
| <b>AASHTO</b> | American Association of State Highway and Transportation Officials |
| <b>ACI</b>    | American Concrete Institute  |
| <b>AEC</b>    | Architecture/Engineering/Construction                              |
| <b>AFCEC</b>  | Air Force Civil Engineer Center                                    |
| <b>AHJ</b>    | Authority Having Jurisdiction (See MIL-STD 3007G, Nov 2019)        |
| <b>AISC</b>   | American Institute of Steel Construction                           |
| <b>AISI</b>   | American Iron and Steel Institute                                  |
| <b>ANSI</b>   | American National Standards Institute                              |
| <b>AREMA</b>  | American Railway Engineering and Maintenance-of-Way Association    |
| <b>ASCE</b>   | American Society of Civil Engineers                                |
| <b>ASM</b>    | American Society for Metals  |
| <b>ASME</b>   | American Society of Mechanical Engineers                           |
| <b>ASSE</b>   | American Society of Safety Engineers                               |
| <b>ASTM</b>   | American Society for Testing and Materials, now ASTM International |
| <b>ATFP</b>   | Anti-Terrorism Force Protection                                    |
| <b>ATCT</b>   | Air Traffic Control Tower  |
| <b>AWWA</b>   | American Water Works Association                                   |
| <b>BIA</b>    | Brick Industry Association (formerly Brick Institute of America)   |
| <b>BPON</b>   | Basic Performance Objective Equivalent to New Building Standards   |
| <b>BSE</b>    | Basic Safety Earthquake  |
| <b>CEFAPP</b> | CERL Equipment Fragility and Protection Procedure                  |

|               |  |
|---------------|--|
| <b>CERL</b>   | Construction Engineering Research Laboratory (formerly USACERL)  |
| <b>CP</b>     | Collapse Prevention  |
| <b>CRREL</b>  | Cold Regions Research and Engineering Laboratory   |
| <b>DC</b>     | Damage Control   |
| <b>DoD</b>    | Department of Defense  |
| <b>DoE</b>    | Department of Energy   |
| <b>EGL</b>    | Energy Grade Line  |
| <b>ELF</b>    | Equivalent Lateral Force   |
| <b>EPRI</b>   | Electric Power Research Institute  |
| <b>ERDC</b>   | U.S. Army Engineer Research and Development Center   |
| <b>FEMA</b>   | Federal Emergency Management Agency  |
| <b>GERS</b>   | Generic Equipment Ruggedness Spectra   |
| <b>GIP</b>    | Generic Implementation Procedure   |
| <b>GSREB</b>  | Guidelines for Seismic Retrofit of Existing Buildings  |
| <b>HCAI</b>   | California Department of Health Care Access and Information (formerly California Office of Statewide Health Planning and Development or OSHPD) |
| <b>HVAC</b>   | Heating, Ventilating, and Air Conditioning   |
| <b>IBC</b>    | International Building Code  |
| <b>ICC-ES</b> | International Code Council – Evaluation Service  |
| <b>ICSSC</b>  | Interagency Committee on Seismic Safety in Construction  |
| <b>IEBC</b>   | International Existing Building Code   |
| <b>IEEE</b>   | Institute of Electrical and Electronics Engineers  |
| <b>IMF</b>    | Intermediate Moment Frame  |
| <b>in.</b>    | Inch   |
| <b>in./ft</b> | Inches per Foot  |
| <b>ICBO</b>   | International Conference of Building Officials   |

|                         |   |
|-------------------------|---|
| <b>IO</b>               | Immediate Occupancy (Performance Objective/Level) |
| <b>ISAT</b>             | International Seismic Application Technologies    |
| <b>kg</b>               | Kilogram  |
| <b>kg/m<sup>3</sup></b> | Kilograms per Cubic Meter                         |
| <b>km/h</b>             | Kilometers per Hour                               |
| <b>kN</b>               | Kilonewton  |
| <b>kN/m</b>             | Kilonewton per Meter                              |
| <b>kN/m<sup>2</sup></b> | Kilonewton per Square Meter                       |
| <b>kPa</b>              | Kilopascal  |
| <b>lb/ft</b>            | Pounds per Foot                                   |
| <b>lb</b>               | Pound   |
| <b>LmS</b>              | Limited Safety                                    |
| <b>LRFD</b>             | Load and Resistance Factor Design                 |
| <b>LS</b>               | Life Safety (Performance Objective/Level)         |
| <b>m</b>                | Meter   |
| <b>m/s</b>              | Meters per Second                                 |
| <b>m<sup>2</sup></b>    | Square Meter                                      |
| <b>MC-1</b>             | Mission-Critical Level 1                          |
| <b>MC-2</b>             | Mission-Critical Level 2                          |
| <b>MCE<sub>R</sub></b>  | Risk-Targeted Maximum Considered Earthquake       |
| <b>mil</b>              | 0.001 Inch  |
| <b>mm</b>               | Millimeter  |
| <b>mm<sup>2</sup></b>   | Square Millimeter                                 |
| <b>MPa</b>              | Megapascal  |
| <b>MPa/m</b>            | Megapascal per Meter                              |
| <b>mph</b>              | Miles per Hour                                    |

|                |  |
|----------------|--|
| <b>MRI</b>     | Mean Recurrence Interval                               |
| <b>NACE</b>    | National Association of Corrosion Engineers            |
| <b>NAS</b>     | National Academy of Sciences                           |
| <b>NAVFAC</b>  | Naval Facilities Engineering Command                   |
| <b>NCMA</b>    | National Concrete Masonry Association                  |
| <b>NDP</b>     | Nonlinear Dynamic Procedure                            |
| <b>NEHRP</b>   | National Earthquake Hazards Reduction Program          |
| <b>NFPA</b>    | National Fire Protection Association                   |
| <b>NFS</b>     | Non-Frost Susceptible                                  |
| <b>NIST</b>    | National Institute of Standards and Technology         |
| <b>NL</b>      | Not Limited  |
| <b>NMC</b>     | Non-Mission-Critical                                   |
| <b>NSP</b>     | Nonlinear Static Procedure                             |
| <b>O&amp;M</b> | Operation and Maintenance                              |
| <b>OCBF</b>    | Ordinary Concentrically Braced Frame                   |
| <b>OMF</b>     | Ordinary Moment Frame                                  |
| <b>OP</b>      | Operational (Performance Objective/Level)              |
| <b>OSP</b>     | HCAI Special Seismic Certification Preapproval Program |
| <b>PCI</b>     | Precast/Prestressed Concrete Institute                 |
| <b>pci</b>     | Pounds per Cubic Inch                                  |
| <b>psf</b>     | Pounds per Square Foot                                 |
| <b>psi</b>     | Pounds per Square Inch                                 |
| <b>PSSQ</b>    | Project Specific Seismic Qualification                 |
| <b>PTHA</b>    | Probabilistic Tsunami Hazard Analysis                  |
| <b>PTI</b>     | Post-Tensioning Institute                              |
| <b>RACF</b>    | Radar Approach Control Facility                        |

|                |   |
|----------------|---|
| <b>RC</b>      | Risk Category   |
| <b>RCSC</b>    | Research Council on Structural Connections                                      |
| <b>RFP</b>     | Request for Proposal  |
| <b>RP</b>      | Recommended Practice (also Resource Paper)                                      |
| <b>RRS</b>     | Required Response Spectrum  |
| <b>SBC</b>     | Standard Building Code  |
| <b>SDC</b>     | Seismic Design Category   |
| <b>SDI</b>     | Steel Deck Institute  |
| <b>SDPWS</b>   | Special Design Provisions for Wind and Seismic                                  |
| <b>SEAOC</b>   | Structural Engineers Association of California                                  |
| <b>SEI</b>     | Structural Engineering Institute  |
| <b>SER</b>     | Structural Engineer of Record   |
| <b>SIOR</b>    | Special Inspector of Record   |
| <b>SMF</b>     | Special Moment Frame  |
| <b>TI</b>      | Technical Instruction   |
| <b>TIA</b>     | Tentative Interim Agreement; Telecommunications Industry Association            |
| <b>TMS</b>     | The Masonry Society   |
| <b>TRS</b>     | Test Response Spectrum  |
| <b>UBC</b>     | Uniform Building Code   |
| <b>UFC</b>     | Unified Facilities Criteria   |
| <b>UFGS</b>    | Unified Facilities Guide Specifications   |
| <b>URM</b>     | Unreinforced Masonry  |
| <b>USACE</b>   | U.S. Army Corps of Engineers  |
| <b>USACERL</b> | United States Army Construction Engineering Research Laboratory (now ERDC-CERL) |
| <b>UUT</b>     | Unit Under Test   |

|                        |                                    |
|------------------------|------------------------------------|
| <b>V<sub>asd</sub></b> | Allowable Stress Design Wind Speed |
| <b>V<sub>fm</sub></b>  | Fastest Mile Wind Speed            |
| <b>V</b>               | Basic Wind Speed                   |
| <b>WEF</b>             | Water Environment Federation       |

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A-2

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## APPENDIX A UFC 3-401-01 GLOSSARY

### A-1 ABBREVIATIONS.

|                     |  |
|---------------------|--|
| 14 <sup>th</sup> WS | 14 <sup>th</sup> Weather Squadron                            |
| ADPI                | air diffusion performance index                              |
| AHU                 | air handling unit  |
| ATES                | aquifer thermal energy storage                               |
| BAS                 | building automation system                                   |
| Btuh                | British thermal units per hour                               |
| BTES                | borehole thermal energy storage                              |
| °C                  | degrees Celcius  |
| cfm                 | cubic feet per minute  |
| CFR                 | Code of Federal Regulations                                  |
| C <sub>LFL</sub>    | LFL conversion factor  |
| CO <sub>2</sub>     | carbon dioxide   |
| Cv                  | valve coefficient  |
| dB RE 1g            | decibels relative to a reference value of 1 standard gravity |
| dBA                 | A-scale weighted decibels                                    |
| dBC                 | C-scale weighted decibels                                    |
| DDC                 | direct digital control                                       |
| DOAS                | dedicated outdoor air system                                 |
| ECA                 | Energy Conservation Analysis                                 |
| ECM                 | electrically commutated mtors                                |
| EDVC                | Effective Dispersal Volume Charge                            |
| EMCS                | energy management and control system                         |
| EPA                 | Environmental Protection Agency                              |
| ERV                 | energy recovery ventilator                                   |

|                     |  |
|---------------------|--|
| ESC                 | Environmental Severity Classification      |
| ES/EWS              | emergency shower/eyewash station           |
| EWD                 | Engineering Weather Data                   |
| °F                  | degrees Fahrenheit                         |
| fpm                 | feet per minute                            |
| ft <sup>2</sup>     | square feet                                |
| G                   | standard gravity                           |
| gal                 | gallons                                    |
| GCHP                | ground coupled heat pump                   |
| GLHX                | ground loop heat exchanger                 |
| gpf                 | gallons per flush                          |
| gph                 | gallons per hour                           |
| gpm                 | gallons per minute                         |
| GWHP                | ground water heat pump                     |
| HAZMAT              | Hazardous Material                         |
| HDPE                | High Density Polyethylene                  |
| hr                  | hour                                       |
| HVAC                | Heating, Ventilation, and Air-Conditioning |
| Hz                  | Hertz                                      |
| IAQP                | Indoor Air Quality Procedure               |
| IMC                 | International Mechanical Code              |
| IPC                 | International Plumbing Code                |
| in                  | inches                                     |
| in/sec <sup>2</sup> | inches per square second                   |
| in w.c.             | inches water column                        |
| IP                  | Inch-Pound                                 |

|                |   |
|----------------|---|
| K              | Kelvin  |
| kg             | kilograms                                     |
| km             | kilometers                                    |
| kPa            | kiloPascals                                   |
| Kv             | valve coefficient                             |
| kW             | kilowatts                                     |
| lbs            | pounds  |
| L              | liters  |
| lpf            | liters per flush                              |
| LFL            | Lower Flammability Limit                      |
| lps            | liters per second                             |
| m              | meters  |
| m <sup>2</sup> | square meters                                 |
| m <sup>3</sup> | cubic meters                                  |
| MBtuh          | one thousand Btuh                             |
| MCDB           | Mean coincident dry-bulb                      |
| MCWB           | Mean coincident wet-bulb                      |
| MERV           | Minimum Efficiency Reporting Value            |
| mm             | millimeters                                   |
| NC             | Noise Criteria                                |
| NEMA           | National Electrical Manufacturers Association |
| OSHA           | Occupational Safety and Health Administration |
| OWS            | Operator workstation                          |
| Pa             | Pascals                                       |
| PCB            | polychlorinated biphenyls                     |
| PEX            | cross-linked polyethylene                     |

|       |  |
|-------|--|
| PICV  | pressure independent control valves                    |
| ppm   | parts per million                                      |
| PRV   | pressure reducing valves                               |
| psi   | pounds per square inch                                 |
| psig  | pounds per square inch – gauge                         |
| P/T   | pressure/temperature                                   |
| PV    | photovoltaic   |
| RC    | Room Criteria  |
| RCL   | Refrigeration Concentration Limit                      |
| RPM   | revolutions per minute                                 |
| RT60  | Reverberation time for 60 dB sound                     |
| S     | second   |
| SAR   | Support Analysis Request                               |
| SDHW  | solar domestic hot water                               |
| SDR   | Standard Dimension Ratio                               |
| sf    | square foot  |
| SI    | International System of Units                          |
| SNAP  | Significant New Alternatives Policy                    |
| STC   | Sound Transmission Coefficient                         |
| Sq. m | square meter   |
| T50   | air diffusion device throw at 50 fpm terminal velocity |
| TAB   | testing, adjusting, and balancing                      |
| TES   | thermal energy storage                                 |
| UFAD  | underfloor air distribution                            |
| UMCS  | utility management and control system                  |
| UTES  | underground thermal energy storage                     |

|       |                            |
|-------|----------------------------|
| Veff  | Effective Dispersal Volume |
| VAV   | variable air volume        |
| VFD   | variable frequency drive   |
| VRF   | variable refrigerant flow  |
| W     | watts                      |
| “w.g. | inches water guage         |

## APPENDIX A UFC 3-401-01 REFERENCES

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Noise and Vibration Control Technical Guide

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## APPENDIX A UFC 3-410-01 GLOSSARY

### A-1 ACRONYMS.

|              |   |
|--------------|---|
| AFCEC        | Air Force Civil Engineer Center   |
| ASA (IE&E)   | Assistant Secretary of the Army (Installations, Energy and Environment)   |
| ACGIH        | American Conference of Governmental Industrial Hygienists                 |
| AFCEC        | Air Force Civil Engineer Center   |
| AHJ          | Authority Having Jurisdiction   |
| ANSI         | American National Standards Institute                                     |
| ASHRAE       | American Society of Heating, Refrigeration and Air Conditioning Engineers |
| ASN (EI & E) | Assistant Secretary of the Navy (Energy, Installations and Environment)   |
| BAS          | Building Automation System  |
| BIA          | Bilateral Infrastructure Agreement  |
| Btuh         | British Thermal Units per Hour  |
| °C           | Degrees Celsius   |
| C            | Common  |
| CFM          | Cubic Feet Per Minute   |
| CO2          | Carbon Dioxide  |
| Cv           | Valve Coefficient, English unit version                                   |
| DALT         | Ductwork Air Leakage Testing  |
| DDC          | Direct Digital Control  |
| DOAS         | Dedicated Outdoor Air System  |
| DoD          | Department of Defense   |
| EMCS         | Energy Monitoring Control System  |
| ESC          | Environmental Severity Classification                                     |
| °F           | Degrees Fahrenheit  |
| FAR          | Federal Acquisition Regulations   |

|                 |   |
|-----------------|---|
| ft              | Feet  |
| ft <sup>2</sup> | Square Feet                                       |
| GCHP            | Ground Coupled Heat Pumps                         |
| GLHX            | Ground Loop Heat Exchanger                        |
| HNFA            | Host Nation Funded Construction Agreements        |
| HQUSACE         | Headquarters United States Army Corp of Engineers |
| HVAC            | Heating, Ventilating, and Air Conditioning        |
| Hz              | Hertz   |
| ICC             | International Code Council                        |
| IMC             | International Mechanical Code                     |
| km              | Kilometer   |
| kPa             | Kilopascal  |
| Kv              | Valve Coefficient, Metric unit version            |
| kW              | Kilowatt  |
| L               | Liters  |
| lbs             | Pounds  |
| LCCA            | Life Cycle Cost Analysis                          |
| lps             | Liters per second                                 |
| m               | Meters  |
| m/s             | Meters per Second                                 |
| m <sup>2</sup>  | Square Meters                                     |
| m <sup>3</sup>  | Cubic Meters                                      |
| MBtuh           | Thousand British Thermal Units per Hour           |
| MCDB            | Mean Coincident Dry-bulb                          |
| MCWB            | Mean Coincident Wet-bulb                          |

|          |  |
|----------|--|
| MICA     | Midwest Insulation Contractors Association                             |
| MILCON   | Military Construction  |
| MIL-HDBK | Military Handbook  |
| MIL-STD  | Military Standard  |
| mm       | Millimeters  |
| NAVFAC   | Naval Facilities Engineering Systems Command                           |
| NC       | Noise Criteria   |
| NEMA     | National Electrical Manufacturers Association                          |
| NFPA     | National Fire Protection Association                                   |
| Pa       | Pascal's   |
| PI       | Pressure Independent   |
| PICV     | Pressure Independent Control Valve                                     |
| ppm      | Parts Per Million  |
| PRV      | Pressure Reducing Valve  |
| psig     | Pounds Per Square Inch (Gage)  |
| RFP      | Request for Proposal   |
| RPM      | Revolutions per Minute   |
| s        | Second   |
| SAF/IEE  | Secretary of the Air Force for Environment, Safety, and Infrastructure |
| SFPVAV   | Series Fan-Powered VAV Boxes   |
| SMACNA   | Sheet Metal and Air Conditioning Contractors' National Association     |
| SOFA     | Status of Forces Agreement   |
| STD      | Standard   |
| TAB      | Testing, Adjusting and Balancing                                       |
| UFC      | Unified Facilities Criteria  |
| UFGS     | Unified Facilities Guide Specification                                 |

|                  |   |
|------------------|---|
| UL               | Underwriters Laboratories, Inc.                                       |
| UMCS             | Utility Monitoring Control System                                     |
| USD (AT&L)       | Under Secretary of Defense for Acquisition, Technology, and Logistics |
| VAV              | Variable Air Volume   |
| $V_{\text{eff}}$ | Effective Dispersal Volume  |
| VRF              | Variable Refrigerant Flow   |
| VRLA             | Valve-regulated lead-acid   |
| W                | Watts   |
| w.g.             | Water Gage  |

## APPENDIX A UFC 3-410-01 REFERENCES

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### **AMERICAN NATIONAL STANDARDS INSTITUTE (ANSI)**

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### **AMERICAN SOCIETY OF HEATING, REFRIGERATING AND AIR-CONDITIONING ENGINEERS (ASHRAE)**

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*ASHRAE Handbooks: Fundamentals, Applications, Systems and Equipment, and Refrigeration*

*ANSI/ASHRAE Standard 15, Safety Standard for Refrigeration Systems*

*ANSI/ASHRAE Standard 55, Thermal Environmental Conditions for Human Occupancy*

*ANSI/ASHRAE Standard 62.1, Ventilation for Acceptable Indoor Air Quality*

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*ANSI/ASHRAE Standard 154, Ventilation for Commercial Cooking Operations*

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**AMERICAN SOCIETY OF MECHANICAL ENGINEERS (ASME)**

[www.asme.org](http://www.asme.org)

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**INTERNATIONAL CODE COUNCIL (ICC)**

[www.iccsafe.org](http://www.iccsafe.org)

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**MIDWEST INSULATION CONTRACTORS ASSOCIATION (MICA)**

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**NATIONAL FIRE PROTECTION ASSOCIATION (NFPA)**

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NFPA 58, *Liquefied Petroleum Gas Code*

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UFC 1-200-02, *High Performance and Sustainable Building Requirements*

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Systems*

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Systems*

UFGS 25 10 10, *Utility Monitoring and Control System (UMCS) Front End and  
Integration*

## APPENDIX A UFC 3-420-01 GLOSSARY

### A-1 ACRONYMS

|        |  |
|--------|--|
| A/E    | Architect and Engineer   |
| ANSI   | American National Standards Institute  |
| ASHRAE | American Society of Heating, Refrigerating, and Air Conditioning Engineers, Inc. |
| ASME   | American Society of Mechanical Engineers   |
| ASSE   | American Society of Safety Engineers   |
| ASSE   | American Society of Sanitary Engineering   |
| ASTM   | American Society of Testing and Materials  |
| CFR    | Code of Federal Regulations  |
| DoD    | Department of Defense  |
| ES/EWS | Emergency Shower and Eyewash Station   |
| FCCHR  | Foundation for Cross-Connection Control and Hydraulic Research                   |
| FM     | Factory Mutual Corporation   |
| ICC    | International Code Council   |
| IPC    | International Plumbing Code®   |
| ISEA   | International Safety Equipment Association                                       |
| NFPA   | National Fire Protection Association   |
| OSHA   | Occupational Safety and Health Administration                                    |
| PDI    | Plumbing and Drainage Institute  |
| PPI    | Plastic Pipe Institute   |
| SWH    | Service Water Heater   |
| UEPH   | Unaccompanied Enlisted Personnel Housing   |
| UFC    | Unified Facilities Criteria  |

UL Underwriter's Laboratory

UOPH Unaccompanied Officers Personnel Housing

## APPENDIX A UFC 3-420-01 REFERENCES

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### AMERICAN SOCIETY OF SAFETY ENGINEERS (ASSE)

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**DEPARTMENT OF ENERGY**

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**INTERNATIONAL CODE COUNCIL (ICC)**

<http://www.iccsafe.org>

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## APPENDIX A UFC 3-490-06 GLOSSARY

### A-1 ACRONYMS

|          |  |
|----------|--|
| AFCEC    | Air Force Civil Engineer Center            |
| ATCT     | Air Traffic Control Tower                  |
| ATS      | Automatic Transfer Switch                  |
| BIA      | Bilateral Infrastructure Agreement         |
| DOD      | Department of Defense                      |
| EMS      | Emergency Medical Services                 |
| FEO      | Firefighters' Emergency Operation          |
| HQ USACE | Headquarters, U.S. Army Corps of Engineers |
| HNFA     | Host Nation Funded Construction Agreements |
| MR       | Machine Room                               |
| NAVFAC   | Naval Facilities Engineering Command       |
| NEI      | National Elevator Industry                 |
| SME      | Subject Matter Expert                      |
| SOFA     | Status of Forces Agreements                |
| UFC      | Unified Facilities Criteria                |
| UFGS     | Unified Facilities Guide Specification     |
| U.S.     | United States                              |
| VTE      | Vertical Transportation Equipment          |

## APPENDIX A UFC 3-490-06 REFERENCES

### AMERICAN SOCIETY OF CIVIL ENGINEERS

<http://www.asce.org>

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### AMERICAN SOCIETY OF MECHANICAL ENGINEERS

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ASME A17.1, Safety Code for Elevators and Escalators

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### INTERNATIONAL CODE COUNCIL

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### NATIONAL FIRE PROTECTION ASSOCIATION

<http://www.nfpa.org>

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### UNITED STATES DEPARTMENT OF DEFENSE

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UFC 3-401-01, Mechanical Engineering

UFC 3-501-01, Electrical Engineering

UFC 3-600-01, Fire Protection Engineering for Facilities

UFC 4-510-01, Design: Medical Military Facilities

## APPENDIX A UFC 3-501-01 GLOSSARY

### A-1 ACRONYMS.

|                     |  |
|---------------------|--|
| AC                  | Alternating Current  |
| ACSR                | Aluminum Conductor Steel-Reinforced  |
| AFI                 | Air Force Instruction  |
| AL                  | Aluminum   |
| ANSI                | American National Standards Institute                                      |
| ASHRAE              | American Society of Heating, Refrigerating, and Air-Conditioning Engineers |
| ATS                 | Acceptance Test Specifications   |
| ATS                 | Automatic Transfer Switch  |
| BCO                 | Base Communications Officer  |
| BEQ/BOQ             | Bachelor Enlisted Quarters/Bachelor Officer Quarters                       |
| BICSI               | Building Industry Consulting Services International                        |
| BIL                 | Basic Impulse Level  |
| CAD                 | Computer Aided Drafting  |
| cal/cm <sup>2</sup> | Calories per Centimeter Squared  |
| CATV                | Community Antenna Television   |
| CCTV                | Closed Circuit Television  |
| CT                  | Current Transformer  |
| CU                  | Copper   |
| DC                  | Direct Current   |
| Degrees C           | Degrees Centigrade   |
| Degrees F           | Degrees Fahrenheit   |
| DoD                 | Department of Defense  |
| DOR                 | Designer of Record   |

|                 |  |
|-----------------|--|
| EIA/TIA         | Electronics Industries Association/Telecommunications Industry Association |
| ESS             | Electronic Security Systems  |
| ESS             | Electric Supply Station  |
| FASS            | Facilities Systems Safety program  |
| ft              | Feet (or Foot)   |
| ft <sup>2</sup> | Foot Squared   |
| GFCI            | Ground Fault Circuit Interrupter   |
| GND             | Ground   |
| HEMP            | High-Altitude Electromagnetic Pulse  |
| HID             | High Intensity Discharge   |
| HQUSACE         | Headquarters, U.S. Army Corps of Engineers                                 |
| HVAC            | Heating Ventilation and Air Conditioning                                   |
| hp              | Horsepower   |
| ICS             | Intelligence Community Standard  |
| IEEE            | IEEE (Formerly, Institute of Electrical and Electronic Engineers)          |
| in              | Inch   |
| kcmil           | Thousand circular mils   |
| kV              | Kilovolts  |
| kVA             | Kilo-Volt-Ampere   |
| kVAR            | Kilo-Volt-Ampere-Reactive  |
| m <sup>2</sup>  | Meter Squared  |
| mm              | Millimeter   |
| MDP             | Main Distribution Panel  |
| MVA             | Mega-Volt-Ampere   |
| NAVFAC          | Naval Facilities Engineering Systems Command                               |

|       |   |
|-------|---|
| NEC   | National Electrical Code                        |
| NEMA  | National Electrical Manufacturers Association   |
| NESC  | National Electrical Safety Code                 |
| NETA  | International Electrical Test Association       |
| NFPA  | National Fire Protection Association            |
| NMCI  | Navy and Marine Corps Intranet                  |
| O&M   | Operation and Maintenance                       |
| PCBs  | Polychlorinated Biphenyls                       |
| PPE   | Personal Protective Equipment (Clothing)        |
| PT    | Potential Transformer                           |
| RCDD  | Registered Communications Distribution Designer |
| RFP   | Request for Proposal                            |
| RUS   | Rural Utility Service                           |
| SCIF  | Sensitive Compartmented Information Facility    |
| SF6   | Sulfur Hexafluoride                             |
| SWD   | Switch Duty                                     |
| TSEWG | Tri-Service Electrical Working Group            |
| UFC   | Unified Facilities Criteria                     |
| UFGS  | Unified Facilities Guide Specifications         |
| UL    | Underwriters Laboratories                       |
| UPS   | Uninterruptible Power Supply                    |
| V     | Volt  |
| VA    | Volt-Amp  |
| X/R   | Ratio of Reactance to Resistance                |

## **A-2 DEFINITION OF TERMS.**

**Activity:** The end user of a base or facility.

**Base Communications Officer (BCO):** The person(s) responsible for the telecommunications and data infrastructure for a base or facility.

**Closed Circuit Television (CCTV):** A network of cables and equipment to monitor and transmit video signals throughout a facility.

**Community Antenna Television System (CATV):** A network of cables, headend and electronic components that process and amplify television and frequency-modulated (FM) radio signals for distribution from one central location to outlets throughout a facility.

**Contractor:** Person(s) doing actual construction portion of a project.

**Corrosive Area:** An area identified by the Technical Reviewing Authority as requiring special equipment corrosion mitigation methods.

**Designer of Record:** The engineer responsible for the actual preparation of the construction documents.

**Distribution Device:** A facility located within a dwelling unit for interconnection or cross connection of interior telecommunications wiring. Passive cross connect facilities enable the termination of cable elements and their interconnection or cross-connection by means of jumpers and patch cords.

**Ductbank:** Two or more conduits (or ducts) routed together in a common excavation with or without concrete encasement.

**Electric Supply Station:** A station that transforms the energy level (voltage) for further bulk distribution at medium voltage levels.

**Hot Cap:** A sealed insulated cover over the end of a bare energized conductor.

**Low Voltage System:** An electrical system having a maximum root-mean-square (rms) voltage of less than 1,000 volts.

**Medium Voltage System:** An electrical system having a maximum RMS AC voltage of 1,000 volts to 34.5 kV. Some documents such as ANSI C84.1 define the medium voltage upper limit as 100 kV, but this definition is inappropriate for facility applications.

**Non-Linear Loads:** Loads that convert AC to DC and contain some kind of rectifier.

**Service:** The conductors and equipment for delivering electrical energy from the serving utility or Government-owned system to the wiring system of the premises served.

**Service Point:** Demarcation for the “service point” (for clarification of the NFPA 70 Article 100 definition): at the building/similar support structure service equipment line side connection.

**Site Electrical Utilities:** Site Electrical Utilities are the primary electric power distribution to the facilities and other electrical loads, exterior lighting not attached to the building; and telecommunication services (such as fiber optic, copper cable, CATV) required by the Facilities.

**Systems Furniture:** Modular prewired office furniture.

**Technical Reviewing Authority:** The “discipline specific” person at the DoD organization who is responsible for signing the project design documents. This is different than the authority responsible for waivers and exemptions required by Mil Std 3007.

**Telecommunications Room:** An enclosed space for telecommunications equipment, terminations, and cross-connect wiring for horizontal cabling.

**TEMPEST:** The unclassified name for the studies and investigation of compromising emanations (communications security).

**Utilization Electric Supply Station:** Equipment such as pole or pad-mounted transformers or secondary unit substations that transforms the energy level (voltage) to a utilization voltage for consumer use.

## APPENDIX A UFC 3-501-01 REFERENCES

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<https://www.wbdg.org/dod/ufc>

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UFC 1-200-02, *High Performance and Sustainable Building Requirements*

FC 1-300-09N, *Navy and Marine Corps Design Procedures*

UFC 3-440-01, *Facility-Scale Renewable Energy Systems*

UFC 3-510-01, *Foreign Voltages and Frequencies Guide*

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UFC 3-520-02, *Facility Energy System Resilience and Reliability*

UFC 3-520-05, *Stationary and Mission Batteries*

UFC 3-530-01, *Interior and Exterior Lighting Systems*

UFC 3-535-01, *Visual Air Navigation Facilities*

UFC 3-540-01, *Engine-Driven Generator Systems for Prime and Standby Power Applications*

UFC 3-540-08, *Utility-Scale Renewable Energy Systems*

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UFC 3-550-04: *Installation Microgrid Design*

UFC 3-555-01, *Aircraft Point-of-Use Power Systems*

UFC 3-560-01, *Operation and Maintenance: Electrical Safety*

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UFC 3-575-01, *Lightning and Static Electricity Protection Systems*

UFC 3-580-01, *Telecommunications Interior Infrastructure Planning and Design*

UFC 3-600-01, *Fire Protection Engineering for Facilities*

UFC 4-010-01, *DoD Minimum Antiterrorism Standards for Buildings*

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UFC 4-020-01, *DoD Security Engineering Facilities Planning Manual*

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UFC 4-150-02, *Dockside Utilities for Ship Service*

## **UNIFIED FACILITIES GUIDE SPECIFICATIONS**

UFGS 26 05 73, *Power System Studies*

## **AIR FORCE**

AFI 33-210, *Communications and Information Cryptographic Access Program*  
<https://apps.dtic.mil/sti/pdfs/ADA404994.pdf>

## **U.S. ARMY CORPS OF ENGINEERS**

DA PAM 385-16, *System Safety Management Guide*

EM 385-1-1, *Safety and Health Requirements*

## **U.S. NAVY**

OPNAV M-5100.23, *Navy Safety and Occupational Health Manual*  
<https://www.secnave.navy.mil/doni/SECNAV%20Manuals1/5100.23.pdf>

## **AMERICAN NATIONAL STANDARDS INSTITUTE (ANSI)**

<https://www.ansi.org/>

*Note: Many ANSI documents are sponsored or co-sponsored by other organizations, such as NEMA or IEEE.*

ANSI C84.1, *Electric Power Systems and Equipment—Voltage Ratings (60 Hz)*

## **AMERICAN SOCIETY OF HEATING, REFRIGERATING AND AIR-CONDITIONING ENGINEERS (ASHRAE)**

<https://www.ashrae.org/>

ASHRAE Standard 90.1, *Energy Standard for Buildings Except Low-Rise Residential Buildings*

*Note: Refer to UFC 1-200-02, for applicable publication date*

## **INSTITUTE OF ELECTRICAL AND ELECTRONICS ENGINEERS (IEEE)**

<https://www.ieee.org/>

IEEE C2, *National Electrical Safety Code*

IEEE C37.06, *IEEE Standard for AC High-Voltage Circuit Breakers Rated on a Symmetrical Current Basis – Preferred Ratings and Related Required Capabilities*

IEEE C37.13.1, *IEEE Standard for Definite Purpose Switching Devices for Use in Metal-Enclosed Low-Voltage*

IEEE C37.96, *IEEE Guide for AC Motor Protection*

IEEE C57.12.00, *IEEE Standard General Requirements for Liquid-Immersed Distribution, Power, and Regulating Transformers*

IEEE Std 551, *IEEE Recommended Practice for Calculating AC Short-Circuit Currents in Industrial and Commercial Power Systems*

IEEE Std 1547, *IEEE Standard for Interconnecting Distributed Resources with Electric Power Systems*

IEEE Std 1547.4, *IEEE Guide for Design, Operation, and Integration of Distributed Resource Island Systems with Electric Power Systems*

IEEE Std 551, *IEEE Recommended Practice for Calculating Short-Circuit Currents in Industrial and Commercial Power Systems*

IEEE Std 1584, *IEEE Guide for Performing Arc-Flash Hazard Calculations, including Amendments 1 and 2*

IEEE Std 1584.1, *IEEE Guide for the Specification of Scope and Deliverable Requirements for an Arc-Flash Hazard Calculation Study in Accordance with IEEE Std 1584™*

IEEE Std 3002.3TM, *IEEE Recommended Practice for Conducting Short-Circuit Studies and Analysis of Industrial and Commercial Power Systems*

#### **INTERNATIONAL ELECTRICAL TESTING ASSOCIATION (NETA)**

NETA ATS, *Acceptance Test Specifications*

#### **NATIONAL FIRE PROTECTION ASSOCIATION**

<https://www.nfpa.org/>

NFPA 70, *National Electrical Code*

NFPA 70E, *Standard for Electrical Safety in the Workplace*

NFPA 780, *Standard for the Installation of Lightning Protection Systems*

#### **PROFESSIONAL ELECTRICAL APPARATUS RECONDITIONING LEAGUE (PEARL)**

ANSI/PEARL EERS, *Electrical Equipment Reconditioning Standard for Electrical Apparatus and Equipment used in Commercial and Industrial Applications*

#### **UNDERWRITER'S LABORATORY**

UL 489, *Molded-Case Circuit Breakers and Circuit-Breaker Enclosures*

## APPENDIX A UFC 3-520-01 GLOSSARY

### A-1 ACRONYMS.

|      |   |
|------|---|
| A    | Amperes                                   |
| AC   | Alternating Current                       |
| AC   | Armored Cable                             |
| AFCI | Arc Fault Current Interrupter             |
| AFPA | Air Force Pamphlet                        |
| AHJ  | Authority Having Jurisdiction             |
| ANSI | American National Standards Institute     |
| ASD  | Adjustable Speed Drive                    |
| ATS  | Automatic Transfer Switch                 |
| AWG  | American Wire Gauge                       |
| BEQ  | Bachelor's Enlisted Quarters              |
| BOQ  | Bachelor's Officer Quarters               |
| CCTV | Closed Circuit Television                 |
| CATV | Cable Television                          |
| CFR  | Code of Federal Regulations               |
| COPS | Critical Operations Power System          |
| Dc   | Direct Current                            |
| DCOA | Designated Critical Operations Area       |
| EGSA | Electrical Generating Systems Association |
| EMT  | Electrical Metallic Tubing                |
| ENT  | Electrical Non-Metallic Tubing            |
| EV   | Electric Vehicle                          |
| EVSE | Electric Vehicle Supply Equipment         |
| FC   | Flat Cable Assemblies                     |

|        |  |
|--------|--|
| FCC    | Flat Conductor Cable                                       |
| FMC    | Flexible Metal Conduit                                     |
| FMT    | Flexible Metallic Tubing                                   |
| Ft     | Feet   |
| GFI    | Ground Fault Circuit Interrupter                           |
| GRS    | Galvanized Rigid Steel                                     |
| HDPE   | High Density Polyethylene Conduit                          |
| HID    | High Intensity Discharge                                   |
| Hz     | Hertz  |
| IEEE   | formerly Institute of Electrical and Electronics Engineers |
| IMC    | Intermediate Metal Conduit                                 |
| kA     | Kilo-Amperes   |
| kVA    | Kilo-Volt-Amperes  |
| kW     | Kilowatt   |
| LFMC   | Liquidtight Flexible Metal Conduit                         |
| LFNC   | Liquidtight Flexible Nonmetallic Conduit                   |
| M      | Meter  |
| MCC    | Motor Control Center                                       |
| MCOV   | Maximum Continuous Overvoltage Rating                      |
| Mm     | Millimeter   |
| MC     | Metal-Clad Cable   |
| MI     | Mineral-Insulated, Metal-Sheathed Cable                    |
| MV     | Medium Voltage Cable                                       |
| NAVFAC | Naval Facilities Engineering Systems Command               |
| NEC    | National Electrical Code                                   |
| NEMA   | National Electrical Manufacturers Association              |

|              |   |
|--------------|---|
| NETA         | International Electrical Testing Association    |
| NFPA         | National Fire Protection Association            |
| NM, NMC, NMS | Nonmetallic-Sheathed Cable                      |
| NUCC         | Nonmetallic Underground Conduit with Conductors |
| OSHA         | Occupational Safety and Health Administration   |
| PVC          | Rigid Polyvinyl Chloride Conduit                |
| RMC          | Rigid Metal Conduit                             |
| RMS          | Root-Mean-Square                                |
| RTRC         | Reinforced Thermosetting Resin Conduit          |
| SCIF         | Sensitive Compartmented Information Facilities  |
| SE, USE      | Service-Entrance Cable                          |
| SPD          | Surge Protective Devices                        |
| SWD          | Switching Duty                                  |
| TC           | Power and Control Tray Cable                    |
| TSEWG        | Tri-Service Electrical Working Group            |
| UF           | Underground Feeder and Branch-Circuit Cable     |
| UFC          | Unified Facilities Criteria                     |
| UL           | Underwriters Laboratories                       |
| UPS          | Uninterruptible Power Supply                    |
| USACE        | U.S. Army Corps of Engineers                    |
| V            | Volts   |
| VFD          | Variable Frequency Drive (see ASD)              |
| VRLA         | Valve-Regulated Lead Acid                       |

*Note: The terms listed here are provided for clarification of the design criteria provided in this UFC. Refer to IEEE Std 100 for additional electrical-related definitions.*

**Automatic Transfer Switch (ATS):** A switch designed to sense the loss of one power source and automatically transfer the load to another source of power.

**Branch Circuit:** The circuit conductors and components between the final overcurrent device protecting the circuit and the equipment.

**Closed Transition Switch:** Transfer switch that provides a momentary paralleling of both power sources during a transfer in either direction. The closed transition is possible only when the sources are properly interfaced and synchronized.

**Existing Facility:** A facility is existing if changes to be made are cosmetic or minor in nature.

**Harmonic:** A sinusoidal component of a periodic wave or quantity having a frequency that is an integral multiple of the fundamental frequency.

**Linear Load:** An electrical load device that presents an essentially constant load impedance to the power source throughout the cycle of applied voltage in steady-state operation.

**Listed:** Applies to equipment or materials included in a list published by an organization acceptable to the authority having jurisdiction. The organization periodically inspects production and certifies that the items meet appropriate standards or tests as suitable for a specific use.

**Low Voltage System:** An electrical system having a maximum root-mean-square (rms) voltage of less than 1,000 volts.

**Medium Voltage System:** An electrical system having a maximum RMS AC voltage of 1,000 volts to 34.5 kV. Some documents such as ANSI C84.1 define the medium voltage upper limit as 100 kV, but this definition is inappropriate for facility applications.

**Molded Case Circuit Breaker:** A low voltage circuit breaker assembled as an integral unit in an enclosing housing of insulating material. It is designed to open and close by nonautomatic means, and to open a circuit automatically on a predetermined overcurrent, without damage to itself, when applied properly within its rating.

**Motor Control Center:** A piece of equipment that centralizes motor starters, associated equipment, bus and wiring in one continuous enclosed assembly.

**New Construction:** A facility is considered new if changes to be made are more than cosmetic or minor, such as major renovations, additions, or new facilities.

**Nonlinear Load:** A steady state electrical load that draws current discontinuously or has the impedance vary throughout the input ac voltage waveform cycle. Alternatively, a load that draws a nonsinusoidal current when supplied by a sinusoidal voltage source.

**Power Quality:** The concept of powering and grounding sensitive equipment in a manner that is suitable to the operation of that equipment.

**Service Voltage:** Voltage at the facility service entrance location.

**Short Circuit:** An abnormal condition (including an arc) of relatively low impedance, whether made accidentally or intentionally, between two points of different potential.

**Subject to Physical Damage (or Subject to Severe Physical Damage):** Locations that are subject to physical damage or severe physical damage include:

- Exposed interior raceways installed less than 6 ft above finished floor elevation where personnel are operating mechanized equipment on a recurring basis. Mechanized equipment that might be operated on a recurring basis includes vehicles, carts, forklifts, and pallet-handling units.
- Exposed exterior raceways installed less than 8 ft above finished grade or 8 ft above floor elevation for raceways on elevated platforms, loading docks, or stairwells.
- Exposed raceways where personnel operate mobile or fixed-in-place hoisting equipment.

**Surge Protector:** A device composed of any combination of linear or nonlinear circuit elements and intended for limiting surge voltages on equipment by diverting or limiting surge current; it prevents continued flow of current and is capable of repeating these functions as specified.

**Transfer Switch:** A device for transferring one or more load conductor connections from one power source to another.

**Uninterruptible Power Supply System:** A system that converts unregulated input power to voltage and frequency controlled filtered ac power that continues without interruption even with the deterioration of the input ac power.

**Utilization Voltage:** The voltage at the line terminals of utilization equipment.

## APPENDIX A UFC 3-520-01 REFERENCES

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UFC 1-200-01, *DoD Building Code*

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UFC 3-501-01, *Electrical Engineering*

UFC 3-510-01, *Foreign Voltages and Frequencies Guides*

UFC 3-520-05, *Stationary and Mission Batteries*

UFC 3-530-01, *Interior and Exterior Lighting Systems*

UFC 3-540-01, *Engine-Driven Generator Systems for Prime and Standby Power Applications*

UFC 3-550-01, *Exterior Electrical Power Distribution*

UFC 3-555-01, *Aircraft Point-of-Use Power Systems*

UFC 3-560-01, *Operation and Maintenance: Electrical Safety*

UFC 3-575-01, *Lightning and Static Electricity Protection Systems*

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### TRI-SERVICE ELECTRICAL WORKING GROUP

<https://www.wbdg.org/dod/supp-tech-documents>

TSEWG TP-02, *Capacitors for Power Factor Correction*

TSEWG TP-04, *Stationary Battery and Charger Sizing*

TSEWG TP-05, *Interior Transformer Ratings and Installation*

TSEWG TP-08, *Equipment Enclosures and Hazardous Locations*

TSEWG TP-09, *Automatic Transfer Equipment*

TSEWG TP-19, *Static Uninterruptible Power Supply (UPS)*

#### **DEPARTMENT OF THE AIR FORCE**

AFPAM 32-1186, *Valve-Regulated Lead-Acid Batteries for Stationary Applications*

#### **DEPARTMENT OF THE NAVY**

NAVSEA OP-5, *Ammunition and Explosives Safety Ashore*

#### **OCCUPATIONAL SAFETY AND HEALTH ADMINISTRATION**

<https://www.osha.gov>

29 CFR 1910.305, *Wiring Methods, Components and Equipment for General Use — Design Safety Standards for Electrical Systems*

#### **AMERICAN NATIONAL STANDARDS INSTITUTE (ANSI)**

<https://www.ansi.org/>

Note: Many ANSI documents are sponsored or co-sponsored by other organizations, such as NEMA or IEEE.

ANSI C84.1, *Electric Power Systems Voltage Ratings (60 Hz)*

ANSI Z535.4, *Product Safety Signs and Labels*

#### **AMERICAN SOCIETY OF HEATING, REFRIGERATING AND AIR-CONDITIONING ENGINEERS (ASHRAE)**

<https://www.ashrae.org/>

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#### **INTERNATIONAL ELECTRICAL TESTING ASSOCIATION (NETA)**

<https://www.netaworld.org/home>

ANSI/NETA ATS, *Standard for Acceptance Testing Specifications for Electrical Power Equipment and Systems*

## **INSTITUTE OF ELECTRICAL AND ELECTRONICS ENGINEERS (IEEE)**

<https://www.ieee.org/>

IEEE C37.20.1, *IEEE Standard for Metal-Enclosed Low-Voltage (1000 Vac and below, 3200 Vdc and below) Power Circuit Breaker Switchgear*

IEEE C37.20.7, *IEEE Guide for Testing Switchgear Rated Up to 52 kV for Internal Arcing Faults*

IEEE C37.20.9, *IEEE Standard for Metal-Enclosed Switchgear Rated 1 kV to 52 kV Incorporating Gas Insulating Systems*

IEEE C37.23, *IEEE Standard for Metal-Enclosed Bus*

IEEE C57.110, *IEEE Recommended Practice for Establishing Liquid-Immersed and Dry-Type Power and Distribution Transformer Capability When Supplying Nonsinusoidal Load Currents*

IEEE C62.41, *IEEE Recommended Practice for Surge Voltages in Low-Voltage AC Power Circuits*

IEEE Std 100, *The Authoritative Dictionary of IEEE Standards Terms*

IEEE Std 450, *IEEE Recommended Practice for Maintenance, Testing, and Replacement of Vented Lead-Acid Batteries for Stationary Applications*

IEEE Std 484, *IEEE Recommended Practice for Installation Design and Installation of Vented Lead-Acid Batteries for Stationary Applications*

IEEE Std 485, *IEEE Recommended Practice for Sizing Lead-Acid Batteries for Stationary Applications*

IEEE Std 519, *IEEE Standard for Harmonic Control in Electrical Power Systems*

IEEE Std 1106, *IEEE Recommended Practice for Installation, Maintenance, Testing, and Replacement of Vented Nickel-Cadmium Batteries for Stationary Applications*

IEEE Std 1115, *IEEE Recommended Practice for Sizing Nickel-Cadmium Batteries for Stationary Applications*

IEEE Std 1159, *IEEE Recommended Practice for Monitoring Electric Power Quality*

IEEE Std 1184, *IEEE Guide for Batteries for Uninterruptible Power Supply Systems*

IEEE Std 1187, *IEEE Recommended Practice for Installation Design and Installation of Valve-Regulated Lead-Acid Storage Batteries for Stationary Applications*

IEEE Std 1188, *IEEE Recommended Practice for Maintenance, Testing, and Replacement of Valve Regulated Lead-Acid (VRLA) Batteries for Stationary Applications*

IEEE Std 1189, *Guide for Selection of Valve Regulated Lead-Acid (VRLA) Batteries for Stationary Applications*

IEEE Std 1375, *Guide for the Protection of Stationary Battery Systems*

## **NATIONAL ELECTRICAL MANUFACTURER'S ASSOCIATION (NEMA)**

<https://www.nema.org/>

NEMA ICS 1, *Standard for Industrial Control and Systems: General Requirements*

NEMA ICS 2, *Industrial Control and Systems Controllers, Contactors, and Overload Relays Rated 600 Volts*

NEMA ICS 7, *Adjustable-Speed Drives*

NEMA PB 2, *Deadfront Distribution Switchboards*

NEMA ST 20, *Dry Type Transformers for General Applications*

## **NATIONAL FIRE PROTECTION ASSOCIATION (NFPA)**

<https://www.nfpa.org/>

NFPA 70, *National Electrical Code (NEC)*

NFPA 70E, *Standard for Electrical Safety in the Workplace*

NFPA 72, *National Fire Alarm and Signaling Code*

NFPA 99, *Health Care Facilities Code*

NFPA 780, *Standard for the Installation of Lightning Protection Systems*

## **UNDERWRITER'S LABORATORY**

UL 497A, *Standard for Secondary Protectors for Communications Circuit*

UL 497B, *Protectors for Data Communications and Fire-Alarm Circuits*

UL 845, *Motor Control Centers*

UL 891, *Standard for Switchboards*

UL 1283, *Standard for Electromagnetic Interference Filters*

UL 1449, *Standard for Surge Protective Devices*

UL 1558, *Standard for Metal-Enclosed Low-Voltage Power Circuit Breaker Switchgear*

## APPENDIX A UFC 3-530-01 GLOSSARY

### A-1 ACRONYMS.

|        |  |
|--------|--|
| ACP    | Access Control Point   |
| AFF    | above finished floor   |
| ANSI   | American National Standards Institute                                      |
| ASHRAE | American Society of Heating, Refrigerating, and Air-Conditioning Engineers |
| CCT    | correlated color temperature   |
| CRI    | color rendering index  |
| DoD    | Department of Defense  |
| ECF    | Entry Control Facility   |
| FC     | Facilities Criteria  |
| HID    | high-intensity discharge   |
| Hz     | hertz  |
| kW     | kilowatts  |
| kWh    | kilowatt-hours   |
| LEC    | light-emitting capacitor   |
| LED    | light-emitting diode   |
| LLD    | lamp lumen depreciation  |
| NEC    | National Electric Code   |
| NEMA   | National Electrical Manufacturers Association                              |
| NESC   | National Electrical Safety Code  |
| NFPA   | National Fire Protection Association                                       |
| SF     | square foot  |
| SPD    | spectral power distribution  |
| SSL    | Solid state lighting   |

|      |   |
|------|---|
| THD  | total harmonic distortion               |
| TLED | tubular light-emitting diode            |
| UFC  | Unified Facilities Criteria             |
| UFGS | Unified Facilities Guide Specifications |
| UL   | Underwriters Laboratories               |
| V    | volt                                    |
| W    | watt                                    |

## A-2 DEFINITIONS OF TERMS.

The definitions of lighting terms are from ANSI/IES LS-1-21, *Lighting Science: Nomenclature and Definitions for Illuminating Engineering*.

**Adaptation:** The process by which the retina becomes accustomed to more or less light than it was exposed to during an immediately preceding period. It results in a change in the sensitivity to light.

**Aircraft Maintenance Area:** The full area designated for aircraft parking and maintenance area. Typically includes the depth from the hangar bay door to the back wall and width from the centerline boundary of the neighboring aircraft maintenance zones or to the side wall.

**Altitude:** The angular distance of a heavenly body measured on the great circle that passes perpendicular to the plane of the horizon, through the body and through the zenith. It is measure positively from the horizon to the zenith, from 0 degrees to 90 degrees.

**Ambient Lighting:** Lighting throughout an area that produces general illumination

**Area Lighting Luminaire:** A complete lighting device consisting of a light source and driver, where appropriate, together with its direct appurtenances such as globe, reflector, refractor, housing, and such support as is integral with the housing. The pole, post, or bracket is not considered part of the luminaire.

**Luminance:** Luminance is a property of a geometric ray. Luminance as measured by conventional meters is averaged with respect to two independent variables, area and solid angle; both must be defined for a complete description of a luminance measurement.

**Azimuth:** The angular distance between the vertical plane containing a given line or celestial body and the plane of the meridian.

**Baffle:** A single opaque or translucent element to shield a source from direct view at certain angles, to absorb or block unwanted light, or to reflect and redirect light.

**Ballast:** A device used with an electric-discharge light source to obtain the necessary circuit conditions (voltage, current, and waveform) for starting and operating.

**Bollard:** A type of luminaire having the appearance of a short, thick post, used for walkway and grounds lighting. The optical components are usually top-mounted.

**Bowl:** An open-top diffusing glass or plastic enclosure used to shield a light source from direct view and to redirect or scatter the light.

**Bracket (mast arm):** An attachment to a light source post or pole from which a luminaire is suspended.

**BUG (Backlight, Uplight, Glare):** Backlight – the amount of percent lamp lumens or the luminaire zonal lumens distributed behind a luminaire between zero degrees vertical (nadir) and 90 degrees vertical. Uplight – the percent lamp lumens or the amount of luminaire zonal lumens distributed above a luminaire between 90 and 180 degrees vertical. Glare – the amount of percent lamp lumens or the luminaire zonal lumens distributed 60 and 90 degrees vertical.

**Candela, cd:** The SI unit of luminous intensity, equal to one lumen per steradian (lm/sr).

**Candlepower (cp):** Another term for luminous intensity," expressed in candelas.

**Clerestory:** That part of a building that rises clear of the roofs or other parts and whose walls contain windows for lighting the interior.

**Coefficient of Utilization (CU):** The ratio of luminous flux (lumens) calculated as received on the work plane to the total luminous flux (lumens) emitted by the light sources alone. It is equal to the product of room utilization factor and luminaire efficiency.

**Color Matching:** The action of making a color appear the same as a given color.

**Color Rendering:** Effect of an illuminant on the color appearance of objects by conscious or subconscious comparison with their color appearance under a reference illuminant.

**Color Rendering Index (of a light source) (CRI):** A measure of the degree of color shift objects undergo when illuminated by the light source as compared with those same objects when illuminated by a reference source of comparable color temperature.

**Color Temperature (of a light source):** See Correlated Color Temperature.

**Contrast:** *See Luminance Contrast.*

**Correlated Color Temperature (of a light source) (CCT):** The absolute temperature of a blackbody whose chromaticity most nearly resembles that of the light source.

**Daylight Availability:** The luminous flux from the sun plus sky at a specific location, time, date, and sky condition.

**Diffused Lighting:** Lighting provided on the work plane or on an object that is not incident predominantly from any particular direction.

**Dimmer:** A device used to control the intensity of light emitted by a luminaire or light source by controlling the voltage or current available to it.

**Direct Component:** That portion of the light from a luminaire that arrives at the work plane without being reflected by room surfaces.

**Direct Glare:** Glare resulting from high luminances or insufficiently shielded light sources in the field of view. It is usually associated with bright areas, such as luminaires, ceilings, and windows that are outside the visual task or region being viewed. A direct glare source can also affect performance by distracting attention.

**Direct-Indirect Lighting:** A variant of general diffuse lighting in which the luminaires emit little or no light at angles near the horizontal.

**Direct Lighting:** Lighting involves luminaires that distribute 90 to 100% of the emitted light in the general direction of the surface to be illuminated. The term usually refers to light emitted in a downward direction.

**Directional Lighting:** Lighting provided on the workplane or on an object, predominantly from a preferred direction.

**Disability Glare:** The effect of stray light in the eye whereby the contrast of the retinal image is reduced and, consequently, whereby visibility and visual performance are reduced. A direct glare source that produces discomfort can also produce disability glare by introducing a measurable amount of stray light in the eye.

**Discomfort Glare:** Glare that produces discomfort. It does not necessarily interfere with visual performance or visibility.

**Downlight:** A small direct lighting unit that directs the light downward and can be recessed, surface-mounted, or suspended.

**Efficacy:** See *Luminous Efficacy of a Source of Light*.

**Efficiency:** See *Luminaire Efficiency*.

**Electroluminescence:** The emission of light from a phosphor excited by an electromagnetic field.

**Emergency Exit:** A way out of the premises that is intended to be used only during an emergency.

**Emergency Lighting:** Lighting designed to supply illumination essential to the safety of life and property in the event of a failure of the normal supply. The system must be capable of providing minimum required illuminance specified in NFPA 101.

**Exit Sign:** A graphic device including words or symbols that indicates or identifies an escape route or the location of, or direct to, an exit or emergency exit.

**Floodlight:** A projector designed for lighting a scene or object to a luminance considerably greater than its surroundings.

**Fluorescent Light Source:** A low pressure mercury electric-discharge light source in which a fluorescing coating (phosphor) transforms some of the UV energy generated by the discharge into light.

**Flush-mounted or Recessed Direct/Indirect Luminaire:** A luminaire that is mounted above the ceiling (or behind a wall or other surface) with the opening of the luminaire level with the surface.

**Footcandle, fc:** A unit of illuminance equal to 1 lm/ft<sup>2</sup>.

**Glare:** The sensation produced by luminances within the visual field that are sufficiently greater than the luminance to which the eyes are adapted, which causes annoyance, discomfort, or loss in visual performance, and visibility. Direct glare is caused by excessive light entering the eye from a bright light source. The potential for direct glare exists anytime one has a direct view of a light source. With direct glare, the eye has a harder time seeing contrast and details. A system designed solely on lighting levels, tends to aim more light directly towards a task, thus producing more potential for glare. Direct glare can be minimized with careful equipment selection and placement.

**Globe:** A transparent or diffusing enclosure intended to protect a light source, to diffuse and redirect its light, or to change the color of the light.

**High Ambient Temperatures:** Above 50 degrees Celsius.

**High-Intensity Discharge (HID) Light Source:** An electric-discharge light source in which the light-producing arc is stabilized by bulb wall temperature, and the arc tube has a bulb wall loading in excess of 3 W/cm<sup>2</sup>. HID light sources include groups of light sources known as mercury, metal halide, and high-pressure sodium.

**High-Mast Lighting:** Illumination of a large area by means of a group of luminaires that are designed to be mounted in a fixed orientation at the top of a high mast, generally 20 m (65 ft.) or higher.

**High-Pressure Sodium (HPS) Light Source:** A high intensity discharge (HID) light source in which light is produced by radiation from sodium vapor.

**Illuminance:** The areal density of the luminous flux incident at a point on a surface. Units: lux or footcandles.

**Illuminance (footcandle or lux) Meter:** An instrument for measuring illuminance on a plane. The instrument comprises some form of photodetector with or without a filter driving a digital or analog readout through appropriate circuitry.

**Illumination:** An alternative but deprecated term for illuminance. In this document, it is used in its more general sense of simply "lighting."

**Incandescent Filament Light Source:** A light source in which light is produced by a filament heated to incandescence by an electric current.

**Indirect Component:** The portion of the luminous flux from a luminaire that arrives at the workplane after being reflected by room surfaces.

**Indirect Lighting:** Lighting involving luminaires that distribute 90 to 100% of the emitted light upward.

**Induction Lighting:** Lighting technology that uses electric current to induce an electromagnetic field within the phosphor coated light source. No filaments are used. Its advantages include instant on/off operation, white light with good color rendering characteristics, and a long light source life of 100,000 hours.

**Intensity (candlepower) Distribution Curve:** A curve, often polar, that represents the variation of luminous intensity of a light source or luminaire in the plane through the light center.

**Isolux (Isofootcandle) Line:** A line plotted on any appropriate set of coordinates to show all the points on a surface where the illuminance is the same.

**Kelvin:** The unit of absolute temperature used to designate the color temperature or correlated color temperature of a light source. Symbol: K.

**Light Source:** A generic term for a source created to produce optical radiation.

**Light Source Lumen Depreciation (LLD) Factor:** The fractional loss of light source lumens at rated operating conditions that progressively occurs during light source operation.

**Lens:** A glass or plastic element used in luminaires to change the direction and control the distribution of light rays.

**Light:** Radiant energy that is capable of exciting the retina and producing a visual sensation.

**Light-Emitting Diode (LED):** A p-n junction solid state diode whose radiated output is a function of its physical construction, material used, and exciting current.

**Light Loss Factor (LLF):** Formerly called maintenance factor. The ratio of illuminance (or exitance or luminance) for a given area to the value that would occur if light sources operated at their (initial) rated lumens and if no system variation or depreciation had occurred.

**Light Meter:** A common name for an illuminance meter.

**Light Source Color:** The color of the light emitted by a source.

**Louver:** An optical-control element, usually used in multiples, to shield a source from view at certain angles, to absorb or block unwanted light, or to reflect or redirect light.

**Low-Bay Lighting:** Interior lighting where the roof trusses or ceiling height is approximately 6.1 m (20 ft.) or less above the floor.

**Low-Pressure Mercury Vapor (LPM) Light Source:** A discharge light source (with or without a phosphor coating) in which the partial pressure of mercury vapor does not exceed 100 Pa during operation.

**Low-Pressure Sodium (LPS) Light Source:** A discharge light source in which light is produced by radiation from sodium vapor.

**Lumen, Im:** SI unit of luminous flux. Radiometrically, it is determined from the radiant power (see luminous flux). Photometrically, it is the luminous flux emitted within a unit solid angle (one steradian) by a point source having a uniform luminous intensity of one candela.

**Lumen Depreciation:** The decrease in lumen output that occurs as a lamp is operated, until failure.

**Lumen Method:** A procedure used to determine the relationship between the number and types of lamps, light sources and luminaires, the room characteristics, and the average level of illuminance on the work plane. It takes into account both direct and reflected flux.

**Luminaire (light fixture):** A complete lighting unit consisting of a light source or light sources and driver(s) (when applicable) together with the parts designed to distribute the light, to position and protect the light sources, and to connect the light sources to the power supply.

**Luminaire Dirt Depreciation (LDD):** The ratio of lumens emitted from a luminaire with dirt accumulated to the lumens emitted from the same luminaire when clean.

**Luminaire Efficiency:** The luminous flux emitted by a luminaire, divided by the luminous flux emitted by the source(s). Sometimes called light output ratio (LOR).

**Luminance:** The apparent brightness of a surface, measured in candelas per foot ( $\text{cd}/\text{ft}^2$ ) or square meter ( $\text{cd}/\text{m}^2$ ), sometimes called nits.

**Luminance Contrast:** The relationship between the luminances of an object and its immediate background.

**Luminance Ratio:** The ratio between the luminances any two areas in the visual field.

**Luminous Efficacy of a Source of Light:** The quotient of the total luminous flux emitted to the total light source power input. It is expressed in lumens per watt.

**Luminous Flux:** The time rate of flow of radiant energy, evaluated in terms of a standardized visual response. Units: lumens.

**Matte Surface:** A surface from which the reflection is predominantly diffuse, with or without a negligible specular component.

**Means of Egress:** An unobstructed and continuous way of exit from any point in a building or structure to a public way. It consists of three distinct parts: the exit access,

the exit, and the exit discharge. A means of egress consists of the vertical and horizontal travel ways, including intervening room spaces, doorways, hallways, corridors, passageways, ramps, stairs, lobbies, horizontal exits, escalators, enclosures, courts, balconies, and yards.

**Mercury Light Source:** A high-intensity discharge (HID) light source in which the major portion of the light is produced by radiation from mercury operating at a partial pressure in excess of 10s Pa.

**Mesopic Vision:** Vision with fully adapted eyes at luminance conditions between those of photopic and scotopic vision.

**Multi-level Switching:** Multi-level switching allows multiple light sources within a luminaire to be switched independently. For example, a three light source luminaire would offer four light output settings: 100%, 66%, 33%, and OFF.

**Orientation:** The position of a building with respect to compass directions.

**Overhang:** In roadway lighting: the distance between a vertical line passing through a specified point (often the photometric center) of a luminaire and the curb or edge of a roadway.

**Pendant Luminaire:** See *Suspended luminaire*.

**Peripheral Vision:** The seeing of objects displaced from the primary line of sight and outside the central visual field.

**Photometry:** The measurement of quantities associated with light.

**Photopic Vision:** Vision mediated essentially or exclusively by the cones. It is generally associated with adaptation to a luminance of at least 5 cd/m<sup>2</sup>.

**Point-by-Point Method:** A method of lighting calculation, now called the point method.

**Point Method:** A procedure for predetermining the illuminance at various locations in lighting installations by use of luminaire photometric data. The direct component of illuminance due to the luminaires and the interreflected component of illuminance due to the room surfaces are calculated separately. The sum is the total illuminance at a point.

**Point Source:** A source of radiation, whose dimensions are sufficiently small, compared with the distance between the source and the irradiated surface, that these dimensions can be neglected in calculations and measurements.

**Pole (roadway lighting):** A standard support generally used where luminaires are located.

**Quality of Lighting:** Pertains to the distribution of luminance in a visual environment. The term is used in a positive sense and implies that all luminances contribute favorably to visual performance, visual comfort, ease of seeing, safety, and aesthetics for the specific visual tasks involved.

**Ramped Dimming:** A gradual dimming rate that ensures occupants in the space will not perceive a sudden change in light levels.

**Rated Light Source Life:** The life value assigned to a particular type of light source. This is commonly a statistically determined estimate of average or of median operational life.

**Reflected Glare:** Glare resulting from reflections of high luminances in polished or glossy surfaces in the field of view.

**Reflection:** A general term for the process by which the incident flux leaves a (stationary) surface or medium from the incident side without change in frequency.

**Reflector:** A device used to redirect the flux from a light source by the process of reflection.

**Scotopic Vision:** Vision mediated essentially or exclusively by the rods. It is generally associated with adaptation to a luminance below about  $0.001 \text{ cd/m}^2$ .

**Self-Ballasted Light Sources:** Any arc discharge light source of which the current limiting devices is an integral part.

**Solid State Lighting:** Light sources that generate light through electroluminescence rather than filaments or gas discharge. SSL sources include light emitting diodes (LEDs), organic light emitting diodes (OLEDs), and polymer light emitting diodes (PLED).

**Spacing:** For roadway lighting, the distance between successive lighting units, measured along the centerline of the street.

**Spacing-to-Mounting-Height Ratio:** The ratio of the actual distance between luminaire centers to the mounting height above the horizontal ground or work plane.

**Suspended (pendant) Luminaire:** A luminaire that is hung from a ceiling by supports.

**Table Lamp:** A portable luminaire with a short stand, suitable for mounting on furniture.

**Translucent:** Transmitting light diffusely or imperfectly.

**Transmission:** A general term for the process by which incident flux leaves a surface or medium on a side other than the incident side, without change in frequency.

**Transmittance:** The ratio of the transmitted flux to the incident flux.

**Transmittance, Visible ( $T_{vis}$ ):** The percentage of the visible spectrum transmitted.

**Transparent:** Having the property of transmitting rays of light through its substance so that bodies situated beyond or behind can be distinctly seen.

**Troffer:** A long recessed direct/indirect lighting unit usually installed with the opening flush with the ceiling.

**Tungsten-Halogen Light Source:** A gas-filled tungsten filament incandescent light source containing a certain proportion of halogens in an inert gas whose pressure exceeds 3 atm.

**Uniformity:** Lighting level or illuminance uniformity is important to work surfaces where sustained tasks are performed as well as on wall and ceiling surfaces that make up a significant portion of the field of view. Poor uniformity can cause adaptation problems. Flicker or strobing of luminaires can cause annoyances as well as headaches and fatigue.

**Valance:** A longitudinal shielding member mounted across the top of a window or along a wall (and is usually parallel to the wall) to conceal light sources, giving both upward and downward distributions.

**Valance Lighting:** Lighting comprising light sources shielded by a panel parallel to the wall at the top of a window.

**Veiling Reflection:** Regular (specular) reflection, superimposed on diffuse reflection from an object, that partially or totally obscures the details to be seen by reducing the contrast. This sometimes is called reflected glare. Another kind of veiling reflection occurs when one looks through a pane of glass. A reflected image of a bright element or surface may be seen superimposed on what is viewed through the glass pane.

**Visibility:** The quality or state of being perceivable by the eye. In many outdoor applications, visibility is defined in terms of the distance at which an object can be just perceived by the eye. In indoor applications, it usually is defined in terms of the contrast or size of a standard test object when observed under standardized viewing conditions and having the same threshold as the given object.

**Volt:** The difference in electrical potential between two points in a circuit.

**Watt:** The unit of power (rate of doing work). In electrical calculation, one watt is the power produced by a current of one ampere across a potential difference of one volt.

**Workplane:** The plane on which a visual task is usually done, and on which the illuminance is specified and measured. Unless otherwise indicated, this is assumed to be a horizontal plane 0.76 meters (30 inches) above the floor.

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## APPENDIX A UFC 3-550-01 GLOSSARY

### A-1 ACRONYMS

|           |  |
|-----------|--|
| AC        | Alternating Current                        |
| ACSR      | Aluminum Conductor Steel-Reinforced        |
| ACSS      | Aluminum Conductor Steel Supported         |
| A/E       | Architect/Engineer                         |
| AFCEC     | Air Force Civil Engineer Center            |
| AHJ       | Authority Having Jurisdiction              |
| AL        | Aluminum                                   |
| ASTM      | American Society for Testing and Materials |
| AWG       | American Wire Gauge                        |
| UFC       | Unified Facilities Criteria                |
| BCE       | Base Civil Engineer                        |
| BIL       | Basic Insulation Level                     |
| CT        | Current Transformer                        |
| CU        | Copper                                     |
| DB        | Directional Boring                         |
| DDC       | Direct Digital Control                     |
| DIA       | Diameter                                   |
| DoD       | Department of Defense                      |
| EMCS      | Energy Management and Control System       |
| ESC       | Environmental Severity Classification      |
| ESS       | Electric Supply Station                    |
| Degrees F | Degrees Fahrenheit                         |
| fc        | Footcandles                                |
| ft        | Feet (or Foot)                             |

|                 |   |
|-----------------|---|
| ft <sup>2</sup> | Foot Squared  |
| GPS             | Global Positioning System                                 |
| HDPE            | High Density Polyethylene Electrical                      |
| HQUSACE         | Headquarters, US Army Corps of Engineers                  |
| HV              | High Voltage  |
| HVAC            | Heating Ventilation and Air Conditioning                  |
| Hz              | Hertz   |
| IEEE            | formerly Institute of Electrical and Electronic Engineers |
| in              | Inch  |
| kcmil           | Thousand circular mils                                    |
| kg              | Kilograms   |
| kV              | Kilovolts   |
| kVA             | Kilo-Volt-Ampere  |
| kVAR            | Kilo-Volt-Ampere-Reactive                                 |
| kW              | Kilowatts   |
| lb              | Pound   |
| LTC             | Load-Tap Changing   |
| m               | Meter   |
| m <sup>2</sup>  | Meter Squared   |
| Max             | Maximum   |
| Min             | Minimum   |
| mm              | Millimeter  |
| MPa             | Mega-Pascals  |
| MTS             | Maintenance Testing Specifications                        |
| MVA             | Mega-Volt-Ampere  |
| NAVFAC          | Naval Facilities Engineering Command                      |

|                   |   |
|-------------------|---|
| NEC               | National Electrical Code                      |
| NEMA              | National Electrical Manufacturers Association |
| NETA              | InterNational Electrical Testing Association  |
| NFPA              | National Fire Protection Association          |
| OH                | Overhead                                      |
| O&M               | Operation and Maintenance                     |
| PE                | Professional Engineer                         |
| psi               | Pounds per square inch                        |
| PILC              | Paper Insulated Lead Covered                  |
| PPE               | Personal Protective Clothing                  |
| PT                | Potential Transformer                         |
| PVC               | Polyvinyl Chloride                            |
| RFP               | Request for Proposal                          |
| SCADA             | System Control and Data Acquisition           |
| SF6               | Sodium Hexafluoride                           |
| TSEWG             | Tri-Service Electrical Working Group          |
| UESS              | Utilization Electric Supply Station           |
| UL                | Underwriters Laboratories                     |
| UFC               | Unified Facilities Criteria                   |
| V                 | Volt  |
| VA                | Volt-Amp                                      |
| VFI               | Vacuum Fault Interrupter                      |
| W                 | Watt  |
| W/ft <sup>2</sup> | Watts per Foot Squared                        |
| W/m <sup>2</sup>  | Watts per Meter Squared                       |

## A-2 DEFINITION OF TERMS

**Activity:** With respect to this UFC, approval is provided by the following:

- For the Air Force, this is the Base Civil Engineer.
- For the Navy, this is the Public Works Officer.
- For the Army, this is the Installation Director of Public Works.

**Contractor:** Person(s) doing actual construction portion of a project.

**Corrosive Area:** An area identified by the Technical Reviewing Authority as requiring special equipment corrosion mitigation methods. Corrosive areas include locations with an Environmental Severity Classification (ESC) of C3, C4, and C5. See UFC 1-200-01 for determination of ESC for project locations.

**Designer of Record:** The engineer responsible for the actual preparation of the construction documents.

**Main Electric Supply Station:** A main electric supply station is also referred to as a “switching station” and does not have power transformers to transform from the utility transmission voltage to a lower distribution voltage. The main electric supply station is the installation/utility interface point where further transmission, distribution and utilization of electrical power, the monitoring and control of such power or equipment and the protection of electrical equipment or systems usually becomes the sole responsibility of the Government or their contracted representatives.

**Main Electric Supply Substation:** A main electric supply station that also transforms the energy level (voltage) for further bulk distribution at medium voltage levels. A main electric supply substation includes power (substation) transformers.

**Facility Core Distribution Infrastructure:** System components that constitute a part of the base infrastructure system that are required to provide electrical service to multiple users.

**Low Voltage System:** An electrical system having a maximum root-mean-square (rms) voltage of less than 1,000 volts.

**Medium Voltage System:** An electrical system having a maximum RMS ac voltage of 1,000 volts to 34.5 kV. Some documents such as NEMA C84.1 define the medium voltage upper limit as 100 kV, but this definition is inappropriate for facility applications.

**Primary Distribution:** A system of alternating-current distribution for supplying the primary of distribution transformers from the generating station or substation distribution buses. Primary distribution can be supplied either overhead or underground and includes all associated equipment.

**Project Manager:** Engineer charged with the administration of the project.

**Secondary Distribution:** An alternating-current system that connects the secondaries of distribution transformers to the consumers' services. A secondary distribution is typically operating at low voltage, but could be operating at medium voltage.

**Service:** The conductors and equipment for delivering electrical energy from the serving utility or Government-owned system to the wiring system of the premises served.

**Site Electrical Utilities:** Site Electrical Utilities are the primary electric power distribution to the facilities and other electrical loads, all exterior lighting not attached to the building; and all telecommunication services (fiber optic, copper cable, CATV, etc.) required by the Facilities.

**Switching Station:** refer to Main Electric Supply Station.

**Utilization Electric Supply Station:** Equipment such as pole or pad-mounted transformers or secondary unit substations that transforms the energy level (voltage) to a utilization voltage for consumer use.

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## APPENDIX A UFC 3-580-01 GLOSSARY

### A-1 ABBREVIATIONS AND ACRONYMS.

|          |  |
|----------|--|
| µm       | micrometer   |
| 10G-EPON | 10 Gigabit per second Ethernet passive optical network                     |
| 10G-PON  | 10 Gigabit per second passive optical network                              |
| 8P8C     | 8-position, 8-contact  |
| A        | ampere   |
| A/C      | air conditioning   |
| A/E      | architect/engineer   |
| A/V      | audio visual   |
| AASHTO   | American Association of State Highway and Transportation Officials         |
| ABF      | air blown fiber  |
| AC       | alternating current  |
| ACMS     | Automated Control Management System  |
| ACPA     | American Concrete Pipe Association   |
| ADA      | Americans with Disabilities Act  |
| ADNCon   | area distribution node   |
| AFCEC    | Air Force Civil Engineer Center  |
| AFF      | above the finished floor   |
| AFH      | Army Family Housing  |
| AHJ      | Authority Having Jurisdiction  |
| ANSI     | American National Standards Institute                                      |
| APC      | angle polished connector   |
| APWA     | American Public Works Association  |
| ASHRAE   | American Society of Heating, Refrigeration, and Air Conditioning Engineers |

|         |   |
|---------|---|
| ASTM    | American Society for Testing and Materials                    |
| AV      | audio visual  |
| AWG     | American Wire Gauge   |
| B/P/C/S | base/post/camps/stations                                      |
| BAS     | building automation systems                                   |
| BATB    | base area transport boundary                                  |
| BBC     | backbone bonding conductor                                    |
| BCO     | Base Communications Officer                                   |
| BCT     | bonding conductor for telecommunications                      |
| BD      | building distributor  |
| BEQ     | Bachelor Enlisted Quarters                                    |
| BET     | building entrance terminals                                   |
| BIA     | Bilateral Infrastructure Agreements                           |
| BICSI   | Building Industry Consulting Service, International, Inc.     |
| BIM     | Building Information Modeling                                 |
| BMS     | Building Management System                                    |
| BNC     | bayonet navy connector  |
| BOQ     | Bachelor Officers Quarters                                    |
| BTS     | base transceiver system                                       |
| BTU/hr  | British thermal units per hour                                |
| C4I     | Command, Control, Communications, Computers, and Intelligence |
| CAT6A   | Category 6A   |
| CATV    | community antenna or cable television                         |
| C-C     | center-to-center  |
| CCTV    | closed-circuit television                                     |

|        |  |
|--------|--|
| CD     | chromatic dispersion                                       |
| CE     | compromising emanations                                    |
| CIC    | cable in conduit   |
| CNIC   | Commander Navy Installations Command                       |
| CNSSAM | Committee on National Security Systems Advisory Memorandum |
| CNSSI  | Committee on National Security Systems Instruction         |
| CONUS  | Continental United States                                  |
| CP     | consolidation point  |
| CTTA   | Certified TEMPEST Technical Authority                      |
| CV     | cable vault  |
| Cx     | commissioning  |
| CXA    | Commissioning Agent  |
| CXM    | Commissioning Manager                                      |
| DA     | Department of the Army                                     |
| DAA    | Designated Accreditation Authority                         |
| DAQ    | delivered audio quality                                    |
| DAS    | distributed antenna system                                 |
| dB     | decibel  |
| DB     | direct buried  |
| dBmV   | decibel millivolt  |
| DC     | direct current   |
| DCO    | Dial/Digital Central Office                                |
| DDC    | direct digital controller                                  |
| DIN    | Deutsche Industrie-Normen                                  |
| DISN   | Defense Information System Network                         |

|       |   |
|-------|---|
| DMFO  | Defense Medical Facilities Office         |
| DODIN | Department of Defense Information Network |
| DoN   | Department of Navy                        |
| DOR   | Designer of Record                        |
| DPW   | Directorate of Public Works               |
| DSN   | Defense Switched Network                  |
| DWDM  | dense wave division multiplexing          |
| ED    | edge device                               |
| EDFA  | erbium-doped fiber amplifier              |
| EES   | earth electrode subsystem                 |
| EF    | entrance facility                         |
| EIA   | Electronic Industries Alliance            |
| EOC   | Emergency Operations Center               |
| EPO   | emergency power off                       |
| EPON  | Ethernet passive optical network          |
| ER    | equipment room                            |
| ESS   | enterprise survivable server              |
| EUB   | end user building                         |
| FACP  | fire alarm control panel                  |
| fc    | foot candle                               |
| FCC   | Federal Communications Commission         |
| FD    | floor distributor                         |
| FEC   | Facilities Engineering Command            |
| FO    | fiber-optic                               |
| FO/GO | Flag Officer/General Officer              |

|       |   |
|-------|---|
| FOC   | fiber optic cable                               |
| FOCIS | Fiber Optic Connector Intermateability Standard |
| FOPP  | fiber optic patch panel                         |
| FOUO  | For Official Use Only                           |
| FRCS  | Facility Related Control System                 |
| ft/s  | feet per second                                 |
| Gb    | gigabit   |
| GbE   | gigabit Ethernet                                |
| Gbps  | gigabit per second                              |
| GE    | grounding equalizer                             |
| GEC   | grounding electrode conductor                   |
| GFCI  | ground fault circuit interrupter                |
| GHz   | gigahertz                                       |
| GPON  | gigabit passive optical network                 |
| GPR   | ground penetrating radar                        |
| GSA   | General Services Administration                 |
| HC    | horizontal crossconnect                         |
| HCDS  | hardened carrier distribution systems           |
| HCP   | horizontal connection point                     |
| HDCP  | high definition copy protocol                   |
| HDD   | horizontal directional drilling                 |
| HDMI  | high definition multimedia interface            |
| HDPE  | high density polyethylene                       |
| HNFA  | Host Nation Funded Construction Agreements      |
| hp    | horsepower                                      |

|      |  |
|------|--|
| HVAC | heating, ventilation, and air conditioning           |
| I3A  | Installation Information Infrastructure Architecture |
| IC   | integrated circuit                                   |
| IC   | intermediate crossconnect                            |
| ICAN | Installation and Campus Area Network                 |
| ICD  | Intelligence Community Directive                     |
| ICDS | installation communications distribution system(s)   |
| ICG  | installation communications grid                     |
| ICS  | industrial control system                            |
| ICT  | information and communications technology            |
| IDC  | insulation displacement connector                    |
| IDF  | intermediate distribution frame                      |
| IDS  | intrusion detection system                           |
| IEC  | International Electrotechnical Commission            |
| IEEE | Institute of Electrical and Electronics Engineers    |
| IFC® | International Fire Code®                             |
| IMA  | Information Mission Area                             |
| IMC  | intermediate metallic conduit                        |
| IoT  | Internet of Things                                   |
| IP   | internet protocol                                    |
| IPN  | installation processing node                         |
| IPS  | intrusion prevention system                          |
| IPTV | internet protocol television                         |
| IS   | information system                                   |
| ISDN | Integrated Services Digital Network                  |

|       |  |
|-------|--|
| ISN   | installation servicing node  |
| ISO   | International Organization for Standardization                                   |
| ISP   | inside plant wiring  |
| IT    | information technology   |
| ITE   | information technology equipment   |
| ITS   | information transport system   |
| ITU   | International Telecommunications Union   |
| ITU-T | International Telecommunication Union - Telecommunication Standardization Sector |
| JWICS | Joint Worldwide Intelligence Communications System                               |
| Km    | kilometer  |
| kPa   | kilopascal   |
| LAN   | local area network   |
| LATB  | local area transport boundary  |
| lb    | pound  |
| LC    | lucent connector   |
| LPS   | limited power source   |
| LSA   | line-sharing adapter   |
| LSA+  | line-sharing adapter plus  |
| LSPM  | light source and power meter   |
| LVDC  | low voltage direct current   |
| m/s   | meters per second  |
| mA    | milliampere  |
| MAC   | moves, adds, and changes   |
| MB    | megabyte   |
| Mb/s  | megabit per second   |

|          |   |
|----------|---|
| MC       | main crossconnect   |
| MCEN     | Marine Corps Enterprise Network                           |
| MCN      | main communications node                                  |
| MDF      | main distribution frame                                   |
| MH       | maintenance holes   |
| MHz      | megahertz   |
| MILCON   | Military Construction                                     |
| MIL-DTL  | Military Detail   |
| MIL-HDBK | Military Handbook   |
| MIL-STD  | Military Standard   |
| MM       | multi-mode  |
| MPa      | megapascal  |
| MPD      | metallic pedestal disconnect                              |
| MPTL     | male plug terminated link                                 |
| MTP®     | Multi-fiber Termination Push-on                           |
| MT-RJ    | mechanical transfer registered jack                       |
| MUTOA    | multi-user telecommunication outlet assembly              |
| N        | Newton  |
| NAVFAC   | Naval Facilities Engineering Command                      |
| NCTAMS   | Naval Computer and Telecommunications Area Master Station |
| NEC®     | National Electrical Code®                                 |
| NEC      | network enterprise center                                 |
| NEMA     | National Electrical Manufacturers Association             |
| NEN      | Naval Enterprise Network                                  |
| NESC®    | National Electrical Safety Code®                          |

|        |   |
|--------|---|
| NETCOM | U.S. Army Network Enterprise Technology Command |
| NFPA   | National Fire Protection Association            |
| NGEN   | Next Generation Enterprise Network              |
| nm     | nanometer                                       |
| NMCI   | Navy and Marine Corps Intranet                  |
| NPCA   | National Precast Concrete Association           |
| NRTL   | Nationally Recognized Testing Laboratory        |
| NSANet | National Security Agency Intranet               |
| NSC    | network service center                          |
| NSI    | National Security Information                   |
| NZDSF  | non-zero dispersion-shifted fiber               |
| OCONUS | outside of the continental United States        |
| OLT    | optical line terminal                           |
| OLTS   | optical loss test sets                          |
| ONT    | optical network terminal                        |
| OSHA   | Occupational Safety and Health Administration   |
| OSP    | outside plant                                   |
| OT     | operational technology                          |
| OTDR   | optical time domain reflectometer               |
| OTN    | optical transport node                          |
| P2P    | peer-to-peer                                    |
| PBB    | primary bonding busbar                          |
| PBX    | private branch exchange                         |
| PC     | physical contact                                |
| PDS    | protected distribution system                   |

|      |                                    |
|------|------------------------------------|
| PE   | polyethylene                       |
| PET  | protected entrance terminal        |
| PF   | fluorinated ethylene propylene     |
| PIC  | plastic insulated cable            |
| PM   | Program Manager                    |
| PMD  | polarization mode dispersion       |
| POC  | point of contact                   |
| PoDL | power over data line               |
| PoE  | power over Ethernet                |
| POH  | Power over HDBaseT                 |
| POL  | passive optical local area network |
| PON  | passive optical network            |
| POTS | plain old telephone service        |
| pr   | pair                               |
| ps   | picosecond                         |
| PSI  | physical site identifier           |
| psi  | pounds per square inch             |
| psi  | pounds per square inch             |
| PVC  | polyvinyl chloride                 |
| PWD  | Public Works Department            |
| PWO  | Public Works Office                |
| QA   | quality assurance                  |
| QC   | quality control                    |
| RBB  | rack bonding busbar                |
| RC   | Regional Coordinator               |

|         |  |
|---------|--|
| RCDD    | Registered Communications Distribution Designer                        |
| RF      | radio frequency  |
| RGB     | rack grounding busbar  |
| RMC     | rigid metallic conduit   |
| ROICC   | Resident Officer in Charge of Construction                             |
| RSC     | rigid steel conduit  |
| RTRC    | red threaded fiberglass conduit/reinforced thermosetting resin conduit |
| RU      | rack unit  |
| RUS     | Rural Utilities Service  |
| SAPF    | Special Access Program Facility  |
| SBB     | secondary bonding busbar   |
| SC      | standard connector   |
| SCADA   | Supervisory Control and Data Acquisition                               |
| SCIF    | Sensitive Compartmented Information Facility                           |
| ScTP    | screened twisted pair  |
| SDAN    | software defined access network  |
| SDR     | standard dimensional ratio   |
| SEBQ    | Senior Enlisted Bachelor Quarters                                      |
| SFP     | small form pluggable   |
| SIDR    | standard internal dimension ratio                                      |
| SIPRNET | Secret Internet Protocol Router Network                                |
| SM      | single-mode  |
| SMF     | single mode fiber  |
| SOFA    | Status of Forces Agreements  |
| SPC     | super personal computer  |

|         |   |
|---------|---|
| ST      | subscriber terminal   |
| STP     | shielded twisted pair   |
| TBB     | telecommunications bonding backbone   |
| TBC     | telecommunications bonding conductor  |
| TDM     | time domain multiplexing  |
| TDMM    | Telecommunications Distribution Methods Manual  |
| TE      | telecommunications enclosure  |
| TEBC    | Telecommunications Equipment Bonding Conductor  |
| TEF     | telecommunications entrance facility  |
| TEMPEST | Telecommunications Electronics Material Protected from Emanating Spurious Transmissions |
| TGB     | telecommunications grounding busbar   |
| TIA     | Telecommunications Industry Association   |
| TMGB    | telecommunications main grounding busbar  |
| TR      | telecommunications room   |
| TS      | telecommunications space  |
| TSB     | Telecommunications Systems Bulletin   |
| UCR     | Unified Capabilities Requirements   |
| UFC     | Unified Facilities Criteria   |
| UFGS    | Unified Facilities Guide Specification  |
| UL      | Underwriters Laboratory   |
| UPC     | ultra physical contact  |
| UPS     | uninterruptable power systems   |
| USACE   | United States Army Corps of Engineers   |
| USDA    | United States Department of Agriculture   |
| USG     | U.S. Government   |

|      |                                     |
|------|-------------------------------------|
| UTP  | unshielded twisted pair             |
| UXO  | unexploded ordnance                 |
| VA   | volt-amp                            |
| VAC  | volts alternating current           |
| VDC  | volts direct current                |
| VDE  | Verband Deutscher Elektrotechniker  |
| VTC  | video teleconference                |
| WAO  | work area outlet                    |
| WAP  | wireless access point               |
| WIDS | wireless intrusion detection system |
| WLAN | wireless local area network         |

## **A-2            DEFINITION OF TERMS.**

**core node:** On an installation (B/P/C/S), a core node (also referred to as a main communications node or area distribution node) is a physical location that typically hosts the commercial point of presence and serves as the aggregation point for the area distribution nodes.

**intra-building backbone:** Connectivity for the voice, video, and data networks between the entrance facility or equipment room, to a telecommunications room.

**inter-building backbone:** Connectivity between buildings, also referred to as part of outside plant (OSP).

**ps:** chromatic dispersion coefficient (Table 3-5)

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## APPENDIX A UFC 3-600-01 GLOSSARY

### A-1 ACRONYMS.

|                 |   |
|-----------------|---|
| °F              | degrees Fahrenheit                                  |
| °C              | degrees Celsius                                     |
| A&E             | Architectural and Engineering Services              |
| ABA             | Architectural Barriers Act                          |
| ABAAG           | Architectural Barriers Act Accessibility Guidelines |
| ACA             | American Correctional Association                   |
| ADP             | Automatic Data Processing                           |
| AFCEC           | Air Force Civil Engineer Center                     |
| AFFF            | Aqueous Film-Forming Foam                           |
| AFMAN           | Air Force Manual                                    |
| AFTO            | Air Force Technical Order                           |
| ANSI            | American National Standards Institute               |
| AR              | Army Regulation                                     |
| ASCE            | American Society of Civil Engineers                 |
| ASME            | American Society of Mechanical Engineers            |
| ASTM            | American Society for Testing and Materials          |
| ATFP            | Anti-Terrorism Force Protection                     |
| AWG             | American Wire Gauge                                 |
| AWWA            | American Water Works Association                    |
| BIA             | Bilateral Infrastructure Agreement                  |
| CAD             | Computer Aided Drafting                             |
| CDC             | Child Development Center                            |
| CFPE            | Component Fire Protection Engineer                  |
| cm <sup>2</sup> | square centimeter(s)                                |

|                 |  |
|-----------------|--|
| CO              | Carbon Monoxide                            |
| CO <sub>2</sub> | Carbon Dioxide                             |
| CRAC            | Computer Room Air Conditioning             |
| CSS             | Central Security Service                   |
| DA              | Department of the Army                     |
| DESR            | Defense Explosives Safety Regulation       |
| DFPE            | Designated Fire Protection Engineer        |
| DLA             | Defense Logistics Agency                   |
| DoD             | Department of Defense                      |
| DoDI            | Department of Defense Instruction          |
| DPDT            | Double-Pole, Double-Throw                  |
| ECB             | Engineering Construction Bulletins         |
| EM              | Engineering Manual                         |
| EMCS            | Energy Monitoring and Control System       |
| ESFR            | Early Suppression Fast-Response Sprinklers |
| ETL             | Engineering Technical Letters              |
| FAAA            | Fire Administration Authorization Act      |
| FACP            | Fire Alarm Control Panel                   |
| FC              | Facilities Criteria                        |
| FM              | Factory Mutual Global                      |
| FPE             | Fire Protection Engineer                   |
| FRT             | Fire Retardant Treated Plywood             |
| FS              | Flame Spread Rating                        |
| ft              | feet; foot                                 |
| ft <sup>2</sup> | square feet; square foot                   |
| gal             | gallon(s)                                  |

|                 |   |
|-----------------|---|
| GH <sub>2</sub> | Gaseous hydrogen                                  |
| GOX             | Gaseous Oxygen                                    |
| gpm             | gallons per minute                                |
| HQUSACE         | Headquarters, U.S. Army Corps of Engineers        |
| HNFA            | Host Nation Funded Construction Agreements        |
| HP              | Horsepower  |
| HVAC            | Heating, Ventilating and Air Conditioning         |
| HVLS            | High Volume Low Speed                             |
| HZ              | Hertz   |
| IBC             | International Building Code                       |
| ICC             | International Code Council                        |
| IEEE            | Institute of Electrical and Electronics Engineers |
| IFC             | International Fire Code                           |
| in              | inch(es)  |
| in <sup>2</sup> | square inch(es)                                   |
| IRC             | International Residential Code                    |
| kPa             | kilopascal  |
| L               | liter(s)  |
| LCD             | Liquid Crystal Display                            |
| LEC             | Electroluminescence                               |
| LED             | Light Emitting Diode                              |
| LH <sub>2</sub> | Liquid Hydrogen                                   |
| LOX             | Liquid Oxygen                                     |
| m               | meter(s)  |
| m <sup>2</sup>  | square meter(s)                                   |
| MAF             | Missile Alert Facilities                          |

|           |  |
|-----------|--|
| MIL-HDBK  | Military Handbook  |
| min       | minute   |
| mm        | millimeter(s)  |
| ms        | milliseconds   |
| NARA      | National Archives and Records Administration   |
| NATOPS    | Naval Air Training & Operating Procedures Standardization  |
| NAVAIR    | Naval Air Systems Command  |
| NAVFAC    | Naval Facilities Engineering Systems Command   |
| NAVSEA    | Naval Sea Systems Command  |
| NCEES     | National Council of Examiners for Engineering & Surveying  |
| NFPA      | National Fire Protection Association   |
| NGA       | National Geospatial-Intelligence Agency  |
| NGR       | National Guard Regulation  |
| NPSH      | Net Positive Suction Head  |
| NRO       | National Reconnaissance Office   |
| NRTL      | Nationally Recognized Testing Laboratory (as defined on the OSHA website <a href="https://www.osha.gov/dts/otpca/nrtl/nrtllist.html">https://www.osha.gov/dts/otpca/nrtl/nrtllist.html</a> ) |
| NSA       | National Security Agency   |
| OHESS     | Office of Occupational Health, Environmental & Safety Services   |
| OPNAVINST | Naval Operations Instructions  |
| P.E.      | Registered Professional Engineer   |
| PIV       | Post Indicator Valve   |
| POL       | Petroleum Oil Lubricant  |
| PRVs      | Pressure-Regulating Valves   |
| psi       | pounds per square inch   |
| PV        | Photovoltaic   |

|      |  |
|------|--|
| QFPE | Qualified Fire Protection Engineer     |
| RPA  | Remotely Piloted Aircraft              |
| s    | second(s)                              |
| SAE  | Society of Automotive Engineers        |
| SD   | Smoke Developed Rating                 |
| SFPE | Society of Fire Protection Engineers   |
| SOFA | Status of Forces Agreements            |
| SPD  | Surge Protection Device                |
| UAS  | Unmanned Aerial System                 |
| UAV  | Unmanned Aerial Vehicle                |
| UFAS | Uniform Federal Accessibility Standard |
| UFC  | Unified Facilities Criteria            |
| UL   | Underwriters Laboratories Inc.         |
| USC  | United States Code                     |
| Vac  | volts alternating current              |
| Vdc  | volts direct current                   |
| WHS  | Washington Headquarters Services       |

## **APPENDIX A UFC 3-600-01 REFERENCES**

### **AMERICAN CORRECTIONAL ASSOCIATION (ACA)**

<http://www.aca.org/>

Planning and Design Guide for Secure Adult and Juvenile Facilities

### **AMERICAN NATIONAL STANDARDS INSTITUTE (ANSI)**

<http://www.ansi.org>

ANSI B1.20.1, Pipe Thread

ANSI/IEEE 979, Guide for Substation Fire Protection

### **AMERICAN WATER WORKS ASSOCIATION (AWWA)**

<http://www.awwa.org>

AWWA Manual M 14, Recommended Practice for Backflow Prevention and Cross Connection Control

AWWA Manual M 17, Installation, Field Testing and Maintenance of Fire Hydrants

AWWA Manual M 31, Distribution System Requirements for Fire Protection

### **ASME INTERNATIONAL**

<http://www.asme.org/>

ASME A17.1, Safety Code for Elevators and Escalators

### **AMERICAN SOCIETY FOR TESTING AND MATERIALS (ASTM)**

<http://www.astm.org>

ASTM A351, Standard Specification for Casting, Austenitic for Pressure-Containing Parts

ASTM E84, Standard Method of Test of Surface Burning Characteristics of Building Materials

ASTM E119, Standard Test Methods for Fire Tests of Building Construction and Materials

ASTM E136, Standard Test Method for Behavior of Materials in a Vertical Tube Furnace at 750°C

ASTM E814, Standard Test Method for Fire Tests of Penetration Firestop Systems

## **DEPARTMENT OF DEFENSE, WASHINGTON HEADQUARTERS SERVICE**

<http://www.dtic.mil/whs/directives/>

DESR 6055.09, Defense Explosives Safety Regulation

## **DEPARTMENT OF THE AIR FORCE**

<http://www.e-publishing.af.mil/>

AFMAN 91-201, Explosives Safety Standard

AFTO 00-25-172, Ground Servicing of Aircraft and Static Grounding/Bonding

## **DEPARTMENT OF THE ARMY**

385-100, Safety Manual

AR 385-10, The Army Safety Program

AR 420-90, Facilities Engineering Fire and Emergency Services

DA PAM 385-61, Toxic Chemical Agent Safety Standards

EM-385-1-1, Safety and Health Requirements Manual

U.S. Army National Guard NGR 385-64, U.S. Army Ammunition and Explosives Safety Standards

## **DEPARTMENT OF DEFENSE**

MIL-STD-101, Standard Practice, Color Code for Pipelines and for Compressed Gas Cylinders

[MIL-STD-3007](#), Standard Practice for Unified Facilities Criteria and Unified Facilities Guide Specifications

DoDI 4165.56, Relocatable Buildings

## **DEPARTMENT OF THE NAVY**

MIL-F-24385F, Fire Extinguishing Agent, Aqueous Film-Forming Foam (AFFF) Liquid Concentrate, for Fresh and Seawater

NAVSEA OP-5, Ammunition and Explosives Ashore Safety Regulations for Handling, Storing, Production, Renovation, and Shipping

OPNAVINST 11010.33, Procurement, Lease and Use of Relocatable Buildings

NAVAIR 00-80R-14, NATOPS Aircraft Firefighting and Rescue Manual

NAVAIR 00-80T-109, Aircraft Refueling NATOPS Manual

SS 521-AA-MAN-010, U.S. Navy, Diving and Manned Hyperbaric Systems Safety Certification Manual

## **DEPARTMENT OF DEFENSE SUPPLEMENTAL TECHNICAL CRITERIA**

<https://www.wbdg.org/ffc/dod/supplemental-technical-criteria>

TSPPEWG G 3-600-01.01-18, Air Force Fire Protection Engineering Criteria and Technical Guidance for Mission Continuity of Electronic, Information Technology, and Telecommunications Equipment Installations

## **EXECUTIVE ORDER**

Executive Order 13728, Wildland-Urban Interface Federal Risk Mitigation of 18 May 2016

## **FACTORY MUTUAL GLOBAL (FM)**

<http://www.fmglobal.com/>

FM Global Data Sheet 1-20, Protection Against Exterior Fire Exposure

FM Global Data Sheet 1-53, Anechoic Chambers

FM Global Data Sheet 5-4, Transformers

FM Global Data Sheet 7-91, Hydrogen

FM Global Data Sheet 8-33, Carousel Storage and Retrieval Systems

FM Global Data Sheet 8-34, Automatic Storage and Retrieval Systems

## **INTERNATIONAL CODE COUNCIL (ICC)**

<http://www.iccsafe.org>

IBC, International Building Code®

IFC, International Fire Code®

IRC, International Residential Code®

IWUIC, International Wildland-Urban Interface Code®

## **NATIONAL FIRE PROTECTION ASSOCIATION (NFPA)**

[www.nfpa.org](http://www.nfpa.org)

NFPA 1, Fire Code

NFPA 10, Standard for Portable Fire Extinguishers

NFPA 11, Standard for Low-, Medium-, and High-Expansion Foam

NFPA 12, Standard on Carbon Dioxide Extinguishing Systems

NFPA 13, Standard for the Installation of Sprinkler Systems

NFPA 13R, Standard for the Installation of Sprinkler Systems in Low-Rise Residential Occupancies

NFPA 13D, Standard for the Installation of Sprinkler Systems in One- and Two-Family Dwellings and Manufactured Homes

NFPA 14, Standard for the Installation of Standpipe and Hose Systems

NFPA 15, Standard for Water Spray Fixed Systems for Fire Protection

NFPA 16, Standard for the Installation of Foam-Water Sprinkler and Foam-Water Spray Systems

NFPA 17, Standard for Dry Chemical Extinguishing Systems

NFPA 17A, Standard for Wet Chemical Extinguishing Systems

NFPA 20, Standard for the Installation of Stationary Pumps for Fire Protection

NFPA 22, Standard for Water Tanks for Private Fire Protection

NFPA 24, Standard for the Installation of Private Fire Service Mains and Their Appurtenances

NFPA 30, Flammable and Combustible Liquids Code

NFPA 30A, Code for Motor Fuel Dispensing Facilities and Repair Garages

NFPA 37, Standard for the Installation and Use of Stationary Combustion Engines and Gas Turbines

NFPA 45, Standard on Fire Protection for Laboratories Using Chemicals

NFPA 51, Standard for the Design and Installation of Oxygen-Fuel Gas Systems for Welding, Cutting, and Allied Processes

NFPA 52, Vehicular Gaseous Fuel Systems Code

NFPA 54, National Fuel Gas Code

NFPA 55, Compressed Gases and Cryogenic Fluids Code

NFPA 58, Liquefied Petroleum Gas Code

NFPA 70, National Electrical Code®

NFPA 72, National Fire Alarm and Signaling Code®

ANSI/NFPA 75, Standard for the Fire Protection of Information Technology Equipment

NFPA 76, Standard for the Fire Protection of Telecommunications Facilities

NFPA 80A, Recommended Practice for Protection of Buildings From Exterior Fire Exposures

NFPA 88A, Standard for Parking Structures

NFPA 90A, Standard for the Installation of Air-Conditioning and Ventilating Systems

NFPA 92, Standard for Smoke Control Systems

NFPA 96, Standard for Ventilation Control and Fire Protection of Commercial Cooking Operations

NFPA 99, Health Care Facilities Code

NFPA 99B, Standard for Hypobaric Facilities

NFPA 101, Life Safety Code®

NFPA 102, Standard for Grandstands, Folding and Telescopic Seating, Tents, and Membrane Structures

NFPA 110, Standard for Emergency and Standby Power Systems

NFPA 150, Fire and Life Safety in Animal Housing Facilities Code

NFPA 170, Standard for Fire Safety and Emergency Symbols

NFPA 204, Standard for Smoke and Heat Venting

NFPA 220, Standard on Types of Building Construction

NFPA 241, Standard for Safeguarding Construction, Alteration, and Demolition Operations

NFPA 255, Standard Method of Test of Surface Burning Characteristics of Building Materials

NFPA 291, Recommended Practice for *Fire Flow* Testing and Marking of Hydrants

NFPA 303, Fire Protection Standard for Marinas and Boatyards

NFPA 307, Standard for the Construction and Fire Protection of Marine Terminals, Piers, and Wharves

NFPA 312, Standard for Fire Protection of Vessels During Construction, Conversion, Repair, and Lay-Up

NFPA 400, Hazardous Materials Code

NFPA 409, Standard on Aircraft Hangars

NFPA 704, Standard System for the Identification of the Hazards of Materials for Emergency Response

NFPA 750, Standard on Water Mist Fire Protection Systems

NFPA 850, Recommended Practice for Fire Protection for Electric Generating Plants and High Voltage Direct Current Converter Stations

NFPA 855, Standard for the Installation of Stationary Energy Storage Systems

NFPA 909, Protection of Cultural Resource Properties - Museums, Libraries, and Places of Worship

NFPA 1141, Standard for Fire Protection Infrastructure for Land Development in Wildland, Rural, and Suburban Areas

NFPA 1142, Standard on Water Supplies for Suburban and Rural Fire Fighting

NFPA 1144, Standard for Reducing Structural Ignition Hazards from Wildland Fire

NFPA 1221, Standard for the Installation, Maintenance, and Use of Emergency Services Communications Systems

NFPA 1963, Standard for Fire Hose Connections

NFPA 2001, Standard on Clean Agent Fire Extinguishing Systems

NFPA 5000, Building Construction and Safety Code®

## **SOCIETY OF AUTOMOTIVE ENGINEERS**

<https://www.sae.org/>

SAE 1010, Steel Properties

## **SOCIETY OF FIRE PROTECTION ENGINEERS**

<http://www.sfpe.org>

SFPE Engineering Guide to Performance-Based Fire Protection Analysis and Design of Buildings

## **UNDERWRITERS LABORATORY (UL)**

<http://www.ul.com/>

UL 864, Standard for Control Units and Accessories for Fire Alarm Systems

UL 1283, Electromagnetic Interference Filters

UL 1449, Surge Protective Devices

UL 1479, Fire Tests of Through-Penetration Firestops

UL 9540A, Test Method for Evaluating Thermal Runaway Fire Propagation in Battery Energy Storage Systems

## **UNIFIED FACILITIES CRITERIA (UFC) AND FACILITIES CRITERIA (FC)**

[http://www.wbdg.org/references/pa\\_dod.php](http://www.wbdg.org/references/pa_dod.php)

FC 4-420-07F, Nuclear Weapons-Capable Maintenance and Storage Facilities

FC 4-740-14N, Navy and Marine Corps Child Development Centers

FC 4-760-10N, Navy Museums and Historic Resource Facilities

UFC 1-200-01, General Building Requirements

UFC 3-230-01, Water Storage, Distribution, and Transmission

UFC 3-301-01, Structural Engineering

UFC 3-400-02, Design: Engineering Weather Data

UFC 3-460-01, Design: Petroleum Fuel Facilities

UFC 3-520-01, Interior Electrical Systems

UFC 3-570-01 - Cathodic Protection

UFC 4-010-01, DoD Minimum Antiterrorism Standards for Buildings

UFC 4-020-01, DoD Security Engineering Facilities Planning Manual

UFC 4-021-01, Design and O&M: Mass Notification Systems

UFC 4-150-02, Dockside Utilities for Ship Service

UFC 4-151-10, General Criteria for Waterfront Construction

UFC 4-152-01, Design: Piers and Wharves

UFC 4-159-01N, Design: Hyperbaric Facilities

UFC 4-211-01, Aircraft Maintenance Hangars

UFC 4-211-02, Aircraft Corrosion Control and Paint Facilities

UFC 4-213-10, Design: Graving Drydocks

UFC 4-213-12, Drydocking Facilities Characteristics

UFC 4-215-01, Armories and Arms Rooms

UFC 4-310-03, DoD Fuels Laboratory Standards

UFC 4-510-01, Design: Medical Military Facilities

UFC 4-740-06, Youth Centers

UFC 4-740-14, Design: Child Development Centers

## **UNITED STATES ACCESS BOARD**

<http://www.access-board.gov/>

ABA/ABAAG, Architectural Barriers Act and Architectural Barriers Act Accessibility Guidelines

## **UNITED STATES DEPARTMENT OF LABOR, OCCUPATIONAL SAFETY AND HEALTH ADMINISTRATION (OSHA)**

<http://www.ecfr.gov/cgi-bin/text-idx?tpl=%2Findex.tpl>

29 CFR 1910.109, Explosives and Blasting Agents

## **UNITED STATES HOUSE OF REPRESENTATIVES, OFFICE OF THE LAW REVISION COUNSEL**

<http://uscode.house.gov/>

USC Title 10, Chapter 8, Subchapter II, Military Child Care

USC Title 15, Section 272, Utilization of Consensus Technical Standards by Federal Agencies

USC Title 15, Section 2225, Hotel-Motel Fire Safety

USC Title 15, Section 2227, Fire Administration Authorization Act ("Fire Safety Act")

USC Title 42, Section 4151 Architectural Barriers Act Of 1968

## APPENDIX A UFC 4-010-01 GLOSSARY

|              |  |
|--------------|--|
| <b>A-1</b>   | <b>ACRONYMS.</b>   |
| <b>ACHP</b>  | Advisory Council on Historic Preservation  |
| <b>ANSI</b>  | American National Standards Institute  |
| <b>ARPA</b>  | Archaeological Resources Protection Act  |
| <b>ASTM</b>  | ASTM International (Not an abbreviation formerly, American Society of Testing and Materials) |
| <b>AT</b>    | Antiterrorism  |
| <b>BIA</b>   | Bilateral Infrastructure Agreements  |
| <b>C</b>     | Tributary width increase factor  |
| <b>CCSD</b>  | Conventional Construction Standoff Distance  |
| <b>CFM</b>   | Cubic Feet per Minute  |
| <b>cm</b>    | Centimeter   |
| <b>CONEX</b> | Container Express  |
| <b>DIN</b>   | Deutsches Institut fur Normung (German Institute for Standardization)                        |
| <b>DBT</b>   | Design Basis Threat  |
| <b>DoD</b>   | Department of Defense  |
| <b>EIFS</b>  | Exterior Insulation and Finish System  |
| <b>ESC</b>   | Expandable Shelter Containers  |
| <b>FCU</b>   | Fan Coil Unit  |
| <b>FPCON</b> | Force Protection Condition   |
| <b>FSTFS</b> | Frame-Supported Tensioned Fabric Structures  |
| <b>ft.</b>   | Feet   |
| <b>GCC</b>   | Geographic Combatant Commander   |
| <b>GP</b>    | General Purpose  |
| <b>GSA</b>   | General Services Administration (U.S.)   |

|                         |  |
|-------------------------|--|
| <b>HNFA</b>             | Host Nation Funded Construction Agreement  |
| <b>HQUSACE</b>          | Headquarters, US Army Corps of Engineers   |
| <b>HVAC</b>             | Heating, Ventilating, and Air Conditioning |
| <b>IGU</b>              | Insulating Glass Units                     |
| <b>in.</b>              | Inches                                     |
| <b>ISC</b>              | Interagency Security Committee             |
| <b>JFOB</b>             | Joint Forward Operations Base              |
| <b>Kg/m<sup>2</sup></b> | Kilograms per square meter                 |
| <b>Kg/m<sup>3</sup></b> | Kilograms per cubic meter                  |
| <b>LB</b>               | Load Bearing                               |
| <b>LOC</b>              | Local Operating Console                    |
| <b>m</b>                | Meters                                     |
| <b>MILCON</b>           | Military Construction                      |
| <b>mm</b>               | Millimeters                                |
| <b>MPa</b>              | MegaPascals                                |
| <b>MSS</b>              | Medium Shelter Systems                     |
| <b>M<sub>cw</sub></b>   | Moment, conventional wall                  |
| <b>M<sub>sse</sub></b>  | Moment, Supporting Structural Element      |
| <b>NATO</b>             | North Atlantic Treaty Organization         |
| <b>NAVFAC</b>           | Naval Facilities Engineering Command       |
| <b>NCR</b>              | National Capital Region                    |
| <b>NFPA</b>             | National Fire Protection Association       |
| <b>NHPA</b>             | National Historic Preservation Act         |
| <b>NLB</b>              | Non-Load Bearing                           |
| <b>OPORD</b>            | Operations Orders                          |
| <b>OSD</b>              | Office of the Secretary of Defense         |

|                        |  |
|------------------------|--|
| <b>Pa</b>              | Pascals  |
| <b>PCF</b>             | Pounds per cubic foot  |
| <b>PDC</b>             | Protective Design Center   |
| <b>PSF</b>             | Pounds per square foot   |
| <b>PSI</b>             | Pounds per square inch   |
| <b>RFP</b>             | Request for Proposal   |
| <b>R<sub>M</sub></b>   | Minimum Standoff Distance  |
| <b>SHAPE</b>           | Supreme Headquarters Allied Powers Europe                            |
| <b>SOFA</b>            | Status of Forces Agreement   |
| <b>SSS</b>             | Small Shelter System   |
| <b>TEMPER</b>          | Tent, Extendable, Modular, Personnel                                 |
| <b>TNT</b>             | Trinitrotoluene  |
| <b>UFC</b>             | Unified Facilities Criteria  |
| <b>USD (AT&amp;L)</b>  | Undersecretary of Defense for Acquisition, Technology, and Logistics |
| <b>V<sub>CW</sub></b>  | Shear, conventional wall   |
| <b>V<sub>SSE</sub></b> | Shear, Supporting Structural Element                                 |

## A-2 DEFINITIONS OF TERMS.

**Access control.** For the purposes of these standards, any combination of barriers, gates, electronic security equipment, and/or guards that can limit entry or parking of unauthorized personnel or vehicles.

**Access road.** Any roadway such as a maintenance, delivery, service, emergency, or other special limited use road that is necessary for the operation of a building or structure.

**Analysis.** For the purposes of evaluating compliance with standoff distance and supporting structure requirements of these standards, evaluation of structural components using commonly accepted analysis methodologies such as single degree of freedom or finite element analysis.

**Breezeway.** A covered passage that passes between two buildings or portions of buildings or covered areas underneath or attached to buildings.

**Building.** A structure, usually enclosed by walls and a roof, constructed to provide support or shelter for an intended occupancy. Note that other structures, such as canopies or gazebos, are not considered buildings for the purposes of these standards.

**Building hardening.** Enhanced conventional construction that mitigates threat hazards where standoff distance is limited. Building hardening may also be considered to include the prohibition of certain building materials and construction techniques.

**Building occupancy.** For the purposes of these standards, the planned occupancy of a building or the allowable occupancy calculated in accordance with life safety codes where the occupancy is not known.

**Building overhangs.** Any structural configuration in which the outer walls or columns of the ground floor are set back from the outer walls or column lines of floors above.

**Building separation.** The distance between closest points on the exterior walls of adjacent buildings or structures.

**Clear Zone.** Areas commonly associated with perimeters that are free of all obstacles, topographical features, and vegetation exceeding 8 in. \1\ (200 mm) /1/ in height that could impede observation or provide cover and concealment of an aggressor.

**Collateral damage.** Injury to personnel or damage to buildings that are not the primary targets of attacks.

**Command vehicles.** Government owned or leased vehicles operated by installation or senior mission commanders, exclusive of privately owned vehicles

**Commercial facilities.** Facilities that are not DoD owned or operated and that support commercial activities other than food service and retail activities such as banks.

**Container structures.** Structures built using shipping containers that are designed to withstand structural loadings associated with shipping, including Container Express (CONEX) and International Organization for Standardization (ISO) containers. Testing has shown that these structures behave similarly to buildings for the purposes of these standards.

**Controlled parking.** For the purposes of these standards, parking that is limited to authorized vehicles that is enforced through physical security measures such as card operated gates, identification or vehicle checks by personnel or similar measures that are acceptable to physical security personnel.

**Controlled perimeter.** For the purposes of these standards, a physical boundary at which vehicle access is controlled with sufficient means to channel vehicles to the access control points. At a minimum, access control at a controlled perimeter requires the demonstrated capability to search for and detect explosives. Where the controlled perimeter includes a shoreline and there is no defined perimeter beyond the shoreline, the boundary for measuring standoff distances will be at the mean high water mark or the elevation associated with top of bank (associated with a flood recurrence interval of 1.2 years).

**Conventional construction.** Building construction that is not specifically designed to resist weapons or explosives effects. Conventional construction is designed only to resist common loadings and environmental effects such as wind, seismic, and snow loads. Note that for the purposes of these standards, conventional construction may still require special windows, structural reinforcement around windows, and progressive collapse resistant construction.

**Conventional construction standoff distance.** The standoff distances at which conventional construction may be used for building components other than doors and windows without a specific analysis of blast effects, except as otherwise required in these standards.

**Change of occupancy.** Change of occupancy level as defined in these standards. It does not relate to conversions of facility category code. Examples include occupancy changing from low occupancy to inhabited.

**Design basis threat.** The threat (aggressors, tactics, and associated weapons, tools or explosives) against which assets within a building must be protected and upon which the security engineering design of the building is based.

**DoD building.** Any building or portion of a building (permanent, temporary, or expeditionary) owned, leased, privatized, or otherwise occupied, managed, or controlled by or for DoD. DoD buildings other than leased buildings are categorized within these standards as low occupancy, inhabited, and high occupancy family housing.

**DoD components.** The Office of the Secretary of Defense (OSD); the Military Departments (including their National Guard and Reserve Components); the Chairman, Joint Chiefs of Staff and Joint Staff; the Combatant Commands; the Office of the

Inspector General of the Department of Defense; the Defense Agencies; the DoD Field Activities; and all other organizational entities within DoD.

**DoD Installation.** A base, camp, post, yard, center, homeport facility for any ship, or other activity under the jurisdiction of the Department of Defense

**DoD personnel.** Any U.S. military, DoD civilian or family member thereof, host-nation employees working for DoD, or contractors occupying DoD buildings. For the purposes of these standards, non-DoD visitors to DoD owned or controlled visitor centers, visitor control centers, museums, and similar facilities will be included in DoD personnel populations of those facilities. Visitor counts will be based on routine visitor levels.

**Door.** A building component for opening or closing an opening in a wall that allows normal access and passage.

**Emergency vehicles.** Vehicles such as fire trucks and ambulances and other vehicles that are critical to emergency response and for which close proximity to inhabited buildings or containment therein is essential.

**Enhanced use lease.** Out leases of non-excess DoD land or facilities to a public or private entities for development under the authority of 10 US Code Section 2667.

**Equivalent level of protection.** Performance of building components that results in building damage or door and glazing hazards similar to that required for the required level of protection as described in **Error! Reference source not found.** or as specified in PDC Technical Report 06-08.

**Expeditionary structures.** \2\ Non-permanent DoD facilities that are erected in support of military operations in accordance with UFC 1-201-01. /2/ This group of structures typically includes but is not limited to tents, Small and Medium Shelter Systems, Expandable Shelter Containers (ESC), ISO and CONEX containers, General Purpose (GP) Medium tents and GP Large tents, trailers, and modular and light wood framed structures.

**Fabric covered structures.** A construction type that can be identified by wood or metal (usually aluminum) posts or load-bearing frames with some type of fabric (such as canvas) stretched or pulled over the posts or frames. Examples of the types of structures that should be considered under this classification of structures include Frame-Supported Tensioned Fabric Structures (FSTFS); Tent, Extendable, Modular, Personnel (TEMPER Tents); and Small and Medium Shelter Systems (SSS and MSS); General Purpose (GP) Medium tents and GP Large tents; and air supported fabric structures. Testing has shown that for these fabric structures, the posts and frames are what cause hazards.

**Family housing.** DoD buildings used as quarters for DoD personnel and their dependents. For the purposes of these standards, family housing will be considered to include Morale, Welfare, and Recreation housing (cottages) and temporary family lodging of similar occupancies.

**Fan Coil Unit (FCU).** A device consisting of a heating and / or cooling heat exchanger (coil) and a fan.

**Final denial active vehicle barrier.** Vehicle barriers that can be raised and lowered or otherwise moved to block traffic lanes to stop the motion of threat vehicles. In Entry Control Facilities / Access Control Points they are located at the end of the response zone (see UFC 4-022-01).

**Fisher Houses.** Houses constructed by the Fisher House Foundation at military medical centers for lodging families of military personnel while the military personnel are hospitalized.

**Force Protection Condition (FPCON).** A DoD-approved system that standardizes the Departments' identification and recommended preventive actions and responses to terrorist threats against U.S. personnel and facilities. This system is the principle means for a commander to apply an operational decision on how to protect against terrorism and facilitates inter-Service coordination and support for antiterrorism activities.

**Glazing.** The part of a window, skylight, or door assembly that is transparent or translucent and transmits light, but not air.

**High occupancy family housing.** Family housing with 13 or more units per building.

**Identification check point.** The location in an Entry Control Facility / Access Control Point at which driver identification is checked to control access into controlled perimeters

**Inhabited building.** Buildings or portions of buildings routinely occupied by 11 or more DoD personnel and with a population density of greater than one person per 430 gross square feet (40 gross square meters). This density generally excludes industrial, maintenance, and storage facilities, except for more densely populated portions of those buildings such as administrative areas. The inhabited building designation also applies to expeditionary structures with similar population densities. In a building that meets the criterion of having 11 or more personnel with low occupancy portions that do not have sufficient population densities to qualify as inhabited buildings, those portions that have sufficient population densities will be considered inhabited buildings while the remainder of the building may be considered low occupancy, subject to provisions of these standards. An example would be a hangar, warehouse, or maintenance facility with an administrative area within it. The administrative area would be treated as an inhabited building while the remainder of the facility could be treated as low occupancy. External stairwells and covered or enclosed walkways are not part of the inhabited space of a building. (Note: This definition differs significantly from the definition for inhabited building used by DoD 6055.09-M and is not to be construed as authorization to deviate from criteria of DoD 6055.09-M.)

**Installation:** For the purposes of these standards, the installation is an area or locality subject to the custody, jurisdiction, or administration of the Secretary of a Military Department or the Secretary of Defense, in the case of an activity in a foreign country,

under the operational control of the Secretary of a Military Department or the Secretary of Defense. This term includes but not limited to, military reservations, bases, posts, camps, stations, or arsenals.

**Installation Perimeter:** For the purposes of these standards, the installation perimeter is defined as any demarcation identifying the limit of DoD property and directly or indirectly indicating that unauthorized access is prohibited. The landside perimeter may be established with fences, walls, signage, natural barriers or other means. The waterside perimeter will be at the mean high water mark or the elevation associated with top of bank (associated with a flood) recurrence interval of 1.2 years) or be established with channel markers, buoys, float lines, signage, or boat barriers.

**Laminated glass.** Multiple sheets of glass bonded together by a bonding interlayer.

**Level of protection.** The degree to which an asset (person, equipment, object, etc.) is protected against injury or damage from an attack.

**Low occupancy building.** Any building or portion of a building routinely occupied by fewer than 11 DoD personnel or with a population density of less than one person per 430 gross square feet (40 gross square meters).

**Low occupancy family housing.** Family housing with 12 or fewer units per building.

**Mail room.** A facility operated by or for the Department of Defense for the receipt and delivery of mail for military units or other authorized organizations and agencies by entities outside the DoD. This does not include mail rooms that receive mail distribution that was initially received at a central DoD mail handling facility.

**Mass notification.** Capability to provide real-time information to all building occupants or personnel in the immediate vicinity of a building during emergency situations.

**Military protective construction.** Military facilities designed to resist military conventional and nuclear weapons to the NATO (or equivalent) standards of hardened, protected, semi-hardened, collaterally protected, or splinter protected.

**Minimum standoff distance.** The smallest permissible standoff distance regardless of any analysis results or hardening of the building.

**Mobile ground tactical platforms.** Vehicle mounted tactical ground station for posting, processing, and distributing real-time intelligence, surveillance, and reconnaissance information.

**Operations support vehicles.** Vehicles such as airfield support equipment or material handling equipment whose purpose is direct support to operations, and which are operated only within a restricted access area.

**Parking areas.** Designated areas where vehicles may be left unattended, including parking lots, designated parking areas along roadways, and roadways within or accessing parking areas.

**Progressive collapse.** The spread of an initial local failure from building element to building element, eventually resulting in the collapse of an entire structure or a disproportionately large part of it.

**Punched window.** A window installed as a punched opening surrounded by cladding, as opposed to being arranged in vertical or horizontal strips.

**Relocatable building.** \3\ A facility that is specially designed and constructed to be readily erected, disassembled, transported, stored, and re-used. Examples of relocatable facilities include, but are not limited to, trailers, CONEX boxes, sheds on skids, tension fabric structures, and air supported domes. A relocatable facility is not constructed as a part of any other military vehicle, DoD tactical equipment (vehicle mounted or wheeled and towable) or equipment which is already accounted for in a designated accountable property system of record. /3/

**Replacement Cost.** The cost to design and construct a facility to current standards and building codes to replace an existing facility at the same location calculated in accordance with UFC 3-701-01.

**Ribbon window.** Windows installed in vertical or horizontal strips with no building wall elements between them but surrounded by cladding around the overall opening perimeter.

**Roadways.** Any surface intended for routine motorized vehicle traffic, including driving lanes of parking areas.

**Routinely occupied.** For the purposes of these standards, an established or predictable pattern of activity within a building that terrorists could recognize and exploit.

**Scaled Range.** A relationship based on cube-root scaling that allows comparisons to be made among blast wave properties created by detonations of different explosive quantities.

**Security engineering.** The process of identifying practical, risk managed short and long-term solutions to reduce and/or mitigate dynamic manmade hazards by integrating multiple factors, including construction, equipment, manpower, and procedures.

**Skylight.** Sloped or horizontal application of a fenestration product that allows for natural day lighting and that may be either fixed (non-operable) or venting (operable).

**Spandrel Glass.** Glass used in non-vision areas of building exteriors

**Specific threat.** Known or postulated aggressor activity focused on targeting a particular asset.

**Standoff distance.** A distance maintained between a building or portion thereof and the potential location for an explosive detonation.

**Structural glazed window systems.** Window systems in which glazing is bonded to both sides of the window frame using an adhesive such as a high-strength, high-performance structural silicone.

**Superstructure.** The supporting elements of a building above the foundation.

**Supporting structural elements.** Structural elements that support windows and that are not in direct contact with the glass, such as walls.

**Temporary buildings.** For the purposes of these standards, those buildings, other than expeditionary structures, that are real property facilities and are designed and constructed with a life expectancy of \3\ seven /3/ years or less.

**Testing.** For the purposes of these standards, experiments performed in accordance with standardized procedures that prove that building components meet the performance required to meet a specific level of protection.

**Town Centers.** Mixed use small scale retail, health, or community services and family housing facilities in the same buildings.

**TNT equivalent weight.** The weight of TNT (trinitrotoluene) that has an equivalent energetic output to that of a different weight of another explosive compound.

**Transitional structures and spaces.** Structures or spaces within buildings that are used to temporarily relocate DoD occupants of buildings while those buildings or other buildings to which they will relocate undergo renovations, modifications, repairs, or restorations or are being constructed. (Also known as swing space.)

**Uncontrolled Public Access.** Spaces within and beneath buildings where there is insufficient positive access control to preclude unauthorized access. For the purposes of these standards, positive access control will be considered to include (but not be limited to) electronic access control on all exterior doors or providing personnel to control visitors.

**Unobstructed space.** Space around inhabited buildings in which there are no opportunities for concealment from observation of explosive devices of no less than a 6 in. (150 mm) cube.

**Window or Skylight Replacement.** The removal of an existing window or skylight assembly and replacement with a new window assembly. For the purposes of this definition a "window assembly" is considered to be the entire system of glazing, framing and anchorage components that fill in and fit within the opening in the wall or roof structure.

## APPENDIX A UFC 4-010-01 REFERENCES

### ADVISORY COUNCIL ON HISTORIC PRESERVATION

<http://www.achp.gov/>

36 CFR Part 800, *Protection of Historic Properties*

### ASTM INTERNATIONAL

<http://www.astm.org>

ASTM E1300, *Standard Practice for Determining Load Resistance of Glass in Buildings*

ASTM E1996, *Standard Specification for Performance of Exterior Windows, Curtain Walls, Doors, and Impact Protective Systems Impacted by Windborne Debris in Hurricanes*

ASTM F1642, *Standard Test Method for Glazing and Glazing Systems Subject to Airblast Loadings*

ASTM F2247, *Standard Test Method for Metal Doors Used in Blast Resistant Applications (Equivalent Static Method)*

ASTM F2248, *Standard Practice for Specifying an Equivalent 3-Second Duration Design Loading for Blast Resistant Glazing Fabricated with Laminated Glass*

ASTM F2912, *Standard Specification for Glazing and Glazing Systems Subject to Airblast Loadings*

ASTM F2927, *Standard Test Method for Door Systems Subject to Airblast Loadings*

### DEPARTMENT OF DEFENSE

<http://www.dtic.mil/whs/directives/index.html>

\3\ DOD Instruction 4165.56, *Relocatable Facilities /3/*

DoD 6055.09-M, *DoD Ammunition and Explosive Safety Standards*

DoD Instruction 2000.12, *DoD Antiterrorism (AT) Program*

DoD Instruction O-2000.16, *DoD Antiterrorism (AT) Program Implementation (Volumes 1 and 2)*

GTA 90-01-011, \1\ *Deployed Forces Protection Handbook (JFOB Handbook)I1I (For Official Use Only [FOUO])*

The Deputy Secretary of Defense, 7 December 2012, *Memorandum, Subject: Antiterrorism Building Standards for Leased Space*

## **DEPARTMENT OF DEFENSE, UNIFIED FACILITIES CRITERIA PROGRAM**

<http://dod.wbdg.org/>

Military Standard (MIL-STD) 3007, *Department Of Defense Standard Practice Standard Practice For Unified Facilities Criteria and Unified Facilities Guide Specifications*

UFC 1-200-01, *DoD Building Code \1V1\*

UFC 4-020-01, *DoD Security Engineering Facilities Planning Manual*

UFC 4-020-02FA, *DoD Security Engineering Facilities Design Manual*

UFC 4-021-01, *Design and O&M: Mass Notification Systems*

UFC 4-022-01, *Security Engineering: Entry Control Facilities/Access Control Points*

UFC 4-023-03, *Design of Buildings to Resist Progressive Collapse*

UFC 4-023-07, *Design to Resist Direct Fire Weapons Effects*

UFC 3-701-01, *DoD Facilities Pricing Guide*

UFC 3-301-01, *Structural Engineering*

## **DEPARTMENT OF HOMELAND SECURITY**

<http://www.dhs.gov/interagency-security-committee>

*Interagency Security Committee Standards*

## **FEDERAL HIGHWAY ADMINISTRATION**

<http://mutcd.fhwa.dot.gov/>

*Manual on Uniform Traffic Control Devices*

## **NATIONAL FIRE PROTECTION ASSOCIATION**

<http://www.nfpa.org>

NFPA 30, *Flammable and Combustible Liquids Code*

## **SUPREME HEADQUARTERS ALLIED POWERS EUROPE**

SHAPE Document 6160/SHLOFA-059/82, *NATO Approved Criteria and Standards for Tactical and Transport Airfields (6th Addition) (NATO Restricted)*

**UNITED STATES ARMY**

<https://pdc.usace.army.mil>

PDC Technical Report 06-08, *Single Degree of Freedom Structural Response Limits for Antiterrorism Design*

PDC Technical Report 10-01, *Conventional Construction Standoff Distances for the Low and Very Low Levels of Protection*

PDC Technical Report 10-02, *Blast Resistant Design Methodologies for Window Systems Designed Statically and Dynamically*

PDC Technical Report 15-01, *Minimum Standoff Distances for Non-Load-Bearing Steel Stud In-Fill Walls*

## APPENDIX A UFC 4-010-06 GLOSSARY

### A-1

### ACRONYMS

#### A-1.1

#### General Acronyms

|       |  |
|-------|--|
| ACL   | Access Control List                                |
| AO    | Authorizing Official                               |
| BAS   | Building Automation System                         |
| BCS   | Building Control System                            |
| CCTV  | Closed Circuit Television                          |
| CNSSI | Committee on National Security Systems Instruction |
| CCI   | Control Correlation Identifier                     |
| COTS  | Commercial Off The Shelf                           |
| CS    | Control System                                     |
| DoD   | Department of Defense                              |
| ESS   | Electronic Security System                         |
| FCN   | Field Control Network                              |
| FCS   | Field Control System                               |
| FIPS  | Federal Information Processing Standards           |
| FISMA | Federal Information Security Management Act        |
| FPOC  | Field Point of Connection                          |
| GFE   | Government Furnished Equipment                     |
| ICS   | Industrial Control System                          |
| IDS   | Intrusion Detection System                         |
| ISSM  | Information System Security Manager                |
| ISSO  | Information System Security Officer                |
| IP    | Internet Protocol                                  |
| IT    | Information Technology                             |
| MOA   | Memorandum Of Agreement                            |
| MOU   | Memorandum Of Understanding                        |
| NIST  | National Institute of Standards and Technology     |
| OS    | Operating System                                   |
| PIT   | Platform Information Technology                    |
| PKI   | Public Key Infrastructure                          |

|       |  |
|-------|--|
| SO    | System Owner                           |
| UCS   | Utility Control System                 |
| UFC   | Unified Facilities Criteria            |
| UFGS  | Unified Facilities Guide Specification |
| UMCS  | Utility Monitoring and Control System  |
| UPS   | Uninterruptible Power Supply           |
| USACE | U.S. Army Corps of Engineers           |

## **A-1.2 Security Control Family Acronyms**

| <b><u>Acronym</u></b> | <b><u>Term</u></b>                    |
|-----------------------|---------------------------------------|
| AC                    | Access Control                        |
| AT                    | Awareness and Training                |
| AU                    | Audit and Accountability              |
| CA                    | Security Assessment and Authorization |
| CM                    | Configuration Management              |
| CP                    | Contingency Planning                  |
| IA                    | Identification and Authorization      |
| IR                    | Incident Response                     |
| MA                    | Maintenance                           |
| MP                    | Media Protection                      |
| PE                    | Physical and Environmental Protection |
| PL                    | Planning                              |
| PM                    | Program Management                    |
| PS                    | Personnel Security                    |
| RA                    | Risk Assessment                       |
| SA                    | System and Services Acquisition       |
| SC                    | System and Communications Protection  |
| SI                    | System and Information Integrity      |

**DEFINITION OF TERMS**

Note that UFGS 25 05 11, "Cybersecurity for Facility-Related Control Systems" also has definitions that complement those provided here.

| <b><u>Term</u></b>                      | <b><u>Definition</u></b>   |
|---|--|
| Authorizing Official (CNSSI No. 4009)   | A senior (federal) official or executive with the authority to formally assume responsibility for operating an information system at an acceptable level of risk to organizational operations (including mission, functions, image, or reputation), organizational assets, individuals, other organizations, and the Nation. Within the DoD, they are presumed to be SES or flag-level officers.   |
| Building Automation System (BAS)        | The system consisting of a UMCS Front End, connected Building Control Systems which control building electrical and mechanical systems, and user interfaces for building control supervision. The BAS is a subsystem of the Utility Monitoring and Control System. This term is being phased out in favor of UMCS.   |
| Building Control System (BCS)           | A system that controls building electrical and mechanical systems such as HVAC (including central plants), lighting, vertical transport systems, and irrigation systems. Building Control Systems generally do not have a full-featured user interface; they may have "local display panels" but typically rely on the UMCS front end for full user interface functionality. BCS is a subsystem of the Utility Monitoring and Control System and is a class of Field Control System. |
| Closed Circuit Television System (CCTV) | An ESS that allows video assessment of alarm conditions via remote monitoring and recording of video events. Video monitoring may also be incorporated into other systems which are not CCTV.  |
| Control Correlation Identifier (CCI)    | The Control Correlation Identifier (CCI) provides a standard identifier and description for each of the singular, actionable statements that comprise a security control.  |

| <b><u>Term</u></b>               | <b><u>Definition</u></b>  |
|----------------------------------|---|
| Control System (CS)              | <p>Control systems are a combination of special purpose controlling devices (controllers), control components (e.g. electrical, mechanical or pneumatic sensors and actuators), and generally (but not always) network infrastructure (which may contain standard IT components) that act together upon underlying mechanical and/or electrical equipment to achieve an objective. A control system (CS) typically consists of sensors and actuators connected to networked digital controllers, includes a user interface, and is used to control and monitor equipment.</p> <p>Some control systems are “monitor only” (they do not exercise control) but are still considered control systems.</p> |
| Controller                       | An electronic device – usually having internal programming logic and digital and analog input/output capability – which performs control functions.   |
| Distributed Control System       | This term describes a system architecture (not system functionality) and appears in some reference material (such as a NIST publications) but is not used by this UFC. (It’s included here due to use in some reference material.)  |
| Electronic Security System (ESS) | The integrated electronic system that encompasses interior and exterior (physical) intrusion detection systems (IDS), CCTV systems for assessment of alarm conditions, access control systems, data transmission media, and alarm reporting systems for monitoring, control, and display.   |
| Engineering Tool Software        | Software that is used to perform device or network management for a control system, including network configuration, controller configuration and controller programming.   |
| Facility-Related Control System  | A control system which controls equipment and infrastructure that is part of a DoD building, structure, or linear structure.  |
| Field Control System (FCS)       | A Building Control System, Utility Control System, Electronic Security System, etc. within the Facility and "downstream" of the FPOC.   |
| Field Control Network (FCN)      | The network used by the Building Control System, Utility Control System, etc., within a facility "downstream" of the FPOC. This includes IP, Ethernet, RS-485, TP/FT-10 and other network infrastructure that support control system(s) in a given facility.  |

| <u>Term</u>                      | <u>Definition</u>   |
|----------------------------------|---|
| Field Point of Connection (FPOC) | The FPOC is the point of connection between the Level 4 control system IP network and the Level 2 field control IP network. Note the Level 2 IP network here may consist entirely of a single patch cable from the FPOC to a Level 1-to-Level 2 device. The hardware which provides the connection at this location is an IT device such as a switch, IP router, or firewall.   |
| [UMCS, ESS, etc.] Front End      | The portion of the control system consisting primarily of IT equipment, such as computers and related equipment, intended to perform operational functions and run monitoring and control/engineering tool application software. The front end does not directly control physical systems; it interacts with them only through field control systems (FCS). The front end is a component of the [UMCS, ESS, etc.] infrastructure (see definition).  |
| Impact                           | <p>The effect on organizational operations, organizational assets, or individuals due to a loss of Confidentiality, Integrity, or Availability in the control system. Impact is categorized as one of three levels:</p> <ul style="list-style-type: none"> <li>• LOW: limited adverse effect</li> <li>• MODERATE: serious adverse effect</li> <li>• HIGH: severe or catastrophic adverse effect</li> </ul> <p>The impact level of a system is generally written in ALL CAPS for clarity. Further discussion of Impact level is in <b>Error! Reference source not found.</b></p> |
| Incident (FIPS PUB 200)          | An occurrence that actually or potentially jeopardizes the confidentiality, integrity, or availability of an information system or the information the system processes, stores, or transmits or that constitutes a violation or imminent threat of violation of security policies, security procedures, or acceptable use policies   |
| Industrial Control System (ICS)  | One type of control system. Most specifically a control system which controls an industrial (manufacturing) process. Sometimes also used to refer to other types of control systems, particularly utility control systems such as electrical, gas, or water distribution systems.   |

| <b><u>Term</u></b>                                 | <b><u>Definition</u></b>  |
|--|---|
| Information System<br>(CNSSI No. 4009)             | A discrete set of information resources organized for the collection, processing, maintenance, use, sharing, dissemination, or disposition of information.<br><br>Note: Information systems also include specialized systems such as industrial/process controls systems, telephone switching and private branch exchange (PBX) systems, and environmental control systems. |
| Information Technology (IT)                        | Any equipment or interconnected system or subsystem of equipment that is used in the automatic acquisition, storage, manipulation, management, movement, control, display, switching, interchange, transmission, or reception of data or information by the executive agency.   |
| [UMCS, ESS, ...]<br>Infrastructure                 | The portion of a control system (such as a UMCS or ESS) which includes all components that are not part of a field control system. These components include the FPOC, the Platform Enclave, and the front end (i.e., its architecture Levels 3, 4 and 5)  |
| Intrusion Detection System (IDS)<br>[Physical/ESS] | A system consisting of interior and exterior sensors, surveillance devices, and associated communication subsystems that collectively detect an intrusion of a specified site, facility, or perimeter and annunciate an alarm.  |
| Intrusion Detection System (IDS) [Cyber]           | A device or software application that monitors network or system activities for malicious activities or policy violations and produces reports to management.   |
| Least Privilege<br>(CNSSI No. 4009)                | The principle that a security architecture should be designed so that each entity is granted the minimum system resources and authorizations that the entity needs to perform its function.   |
| Mobile Code<br>(NIST SP 800-53r4)                  | Software programs or parts of programs obtained from remote information systems, transmitted across a network, and executed on a local information system without explicit installation or execution by the recipient.  |
| Mobile Code Technology<br>(NIST SP 800-53r4)       | Software technologies that provide the mechanisms for the production and use of mobile code (e.g., Java, JavaScript, ActiveX, VBScript). Note that use of Mobile Code Technology does not necessarily imply the use of Mobile Code.   |

| <b><u>Term</u></b>                     | <b><u>Definition</u></b>  |
|--|---|
| Network                                | A network is a group of two or more devices that can communicate using a network protocol. Network protocols must provide a method for addressing devices on the network; a communication method that does not provide an addressing scheme is not a networked form of communication. Devices that communicate using a method of communication that does not support device addressing are not using a network.   |
| Non-Local Maintenance (NIST SP 800-53) | Maintenance activities conducted by individuals communicating through a network; either an external network (e.g., the Internet) or an internal network.  |
| Operational Architecture (OA)          | Those components of a control system that represent the purely operational components of the system such as controllers, Front End software, and other devices which support operational functions. When the “Platform Enclave” approach to authorizing a control system is used, the “non-standard IT” portions of the control system are authorized as the Operational Architecture and the overall system has two authorizations: Platform Enclave and Operational Architecture. |
| [UMCS, ESS, ...] Platform Enclave      | Those components of the control system that are standard IT components and can be secured in a standard manner independent of the type of control system. These components serve only the control system and include the IP network, network management and security devices (e.g., switches, routers), software, computers and/or other devices which provide management and security of the network.  |
| Platform IT (PIT)                      | IT, both hardware and software, which is physically part of, dedicated to, or essential in real time to the mission performance of special purpose systems.   |
| Remote Access (NIST SP 800-53)         | Remote access is access to organizational information systems by users (or processes acting on behalf of users) communicating through external networks (e.g., the Internet). See definition of “User Interface, Remote” for critical distinction in use of terminology   |

| <b><u>Term</u></b>                               | <b><u>Definition</u></b>   |
|--|--|
| Risk<br>(NIST SP 800-53)                         | A measure of the extent to which an entity is threatened by a potential circumstance or event, and typically a function of: (i) the adverse impacts that would arise if the circumstance or event occurs; and (ii) the likelihood of occurrence. Information system-related security risks are those risks that arise from the loss of confidentiality, integrity, or availability of information or information systems and reflect the potential adverse impacts to organizational operations (including mission, functions, image, or reputation), organizational assets, individuals, other organizations, and the Nation. |
| Risk Management<br>(NIST SP 800-53)              | The process of managing risks to organizational operations (including mission, functions, image, reputation), organizational assets, individuals, other organizations, and the Nation, resulting from the operation of an information system, and includes: (i) the conduct of a risk assessment; (ii) the implementation of a risk mitigation strategy; and (iii) employment of techniques and procedures for the continuous monitoring of the security state of the information system.  |
| Supervisory Control and Data Acquisition (SCADA) | This term has a variety of meanings depending on context and is therefore not used in this UFC.  |
| System Owner (SO)<br>(CNSSI No. 4009)            | Person or organization having responsibility for the development, procurement, integration, modification, operation and maintenance, and/or final disposition of an information system.  |
| User Interface                                   | A User Interface is something that allows a person to interact with the control system. For purposes of cybersecurity, a User Interface does not include simple analog and/or binary inputs such as HOA switches, dials, etc. ("Manual Local Input" in UFGS 25 05 11) or simple Card Readers. Proper addressing of User Interfaces is critical for cybersecurity.<br><br>Note that User Interfaces are defined in a more exhaustive and prescriptive manner in UFGS 25 05 11 to enable specification of user interface requirements.   |

## Term

## Definition

User Interface,  
Remote or Local

A Remote User Interface implements a Client/Server model where the physical hardware the user interacts with (Client) is physically distinct from the device being affected (Server). Most or all of the security and functionality characteristics of the user interface are defined by the Server, not the Client. A common example of a remote user interface is a web-based interface where the browser (client) is generally on different hardware than the web server (server). A Remote UI remains a Remote UI even if the user happens to be at a Client on the same hardware as the Server. What is important is that a) the Client may be on different hardware than the Server and b) the majority of the security and functional characteristics of the interface are defined at the Server.

A Local User Interface is a user interface where the physical hardware the user interacts with (keyboard, buttons, display, etc.) is physically part of the device being affected. All of the relevant characteristics of the user interface are embodied within a single device.

Note that this definition of "remote" is consistent with that generally used in the control industry but is not aligned with the NIST 800-53 definition of "Remote" or "Remote Access", which refers to "outside the system". The term "Remote" here better aligns with the NIST 800-53 definition of "Network" (remote from within the system) Access.

User Interface,  
Limited or Full

A Limited User Interface is a user interface that - by design - can only alter information local to the user interface. Note that the determination of "alter" includes only direct interactions, it explicitly excludes interactions that might occur as secondary effects. For example, an interface changing the flow setpoint in a pump controller is a direct interaction, the subsequent change in flow (as well as any subsequent downstream changes in valve position) are not direct interactions. For example, a variable speed drive has a Limited Local User Interface which allows the user to change properties within the drive but does not allow affecting things outside the drive.

A Full User Interface can alter information in devices outside the device with the user interface. For example, a typical Local Display Panel is a Full Local User Interface while a browser-based front end is a Full Remote User Interface.

**Term****Definition**

User Interface,  
Privileged

A Privileged UI is a UI that has sufficient capabilities or functionality that it requires specific cybersecurity measures to be put in place to limit its unauthorized use. Ultimately, whether a specific user interface is considered a Privileged User Interface must be determined by usage. In general however, user interfaces that do not offer significant capabilities above and beyond those available at that location via other means (e.g., a disconnect switch, breaker, hand-off-auto switch, or direct physical attack) are not privileged.

Note that UFGS 25 05 11 contains additional information and requirements on identifying when a UI is a Privileged UI to enable specification of UI requirements.

Utility Control  
System (UCS)

A type of field control system used for control of utility systems such as electrical distribution and generation, sanitary sewer collection and treatment, water generation and pumping, etc. Building controls are excluded from a UCS, however it is possible to have a Utility Control System and a Building Control System in the same facility, and for those systems to share components such as the FPOC. A UCS is a subsystem of a Utility Monitoring and Control System (UMCS) and is a class of Field Control System (FCS).

Utility Monitoring and  
Control System  
(UMCS)

The system consisting of one or more building control systems and/or utility control systems and the associated UMCS Infrastructure. In other words, it is the complete utility monitoring system – from the front end to the controllers. At the highest level the UMCS is composed of a UMCS Platform Enclave and UMCS Front End (jointly referred to as UMCS Infrastructure) and connected Field Control System(s). There are many different names for a UMCS – Energy Monitoring and Control System being a common one – but regardless of the name systems that perform this function are a type of UMCS.

Vulnerability  
(NIST SP 800-53)

Weakness in an information system, system security procedures, internal controls, or implementation that could be exploited or triggered by a threat source.

## APPENDIX A UFC 4-010-06 REFERENCES

### COMMITTEE ON NATIONAL SECURITY SYSTEMS

<https://www.cnss.gov/CNSS/issuances/Instructions.cfm>

CNSSI No. 1253, *Security Categorization and Control Selection for National Security Systems*

CNSSI No. 4009, *Committee on National Security Systems (CNSS) Glossary*

### UNITED STATES DEPARTMENT OF DEFENSE

<https://www.dtic.mil>

Department of Defense Instruction 8500.01, *Cybersecurity*, March 2014

Department of Defense Instruction 8510.01, *Risk Management Framework (RMF) for DoD Information Technology (IT)*, March 2014

### FEDERAL INFORMATION PROCESSING STANDARDS

<https://csrc.nist.gov/publications/fips>

FIPS PUB 200, *Minimum Security Requirements for Federal Information and Information Systems*

FIPS PUB 201-2, *Personal Identity Verification (PIV) of Federal Employees and Contractors*

### INSTITUTE OF ELECTRICAL AND ELECTRONICS ENGINEERS (IEEE)

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