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NAVFAC PTS-C20 (September 2022)  
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Preparing Activity: NAVFAC SUPERSEDING PTS-C20 (December 2018)  
  
PERFORMANCE TECHNICAL SPECIFICATION  
  
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SECTION C20  
  
STAIRS  
09/22

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NOTE: This section is intended to be used as a guide and contains requirements that are common to many different types of facilities. In addition, there may be special requirements for a particular project that are not addressed at all. The RFP preparer will need to incorporate additional information to address these special requirements in this PTS and corresponding Part 3 ESR. If the RFP Preparer chooses to delete building elements that are not required for the project, do not change the remaining Uniformat paragraph designations (example A102001). Uniformat designations are unique to the products they are assigned to. However, the subparagraphs numerical extension (example - 1.2 or a,b,c of the Uniformat designations may change if subparagraphs are deleted).  
  
This guide specification is formatted utilizing Uniformat II, an industry recognized standard, ASTM E 1557. When the RFP preparer chooses to add a paragraph that does not apply to an existing building element already included in the specification, refer to the Uniformat/WBS located on the NAVFAC Design-Build Website for a listing of Uniformat II designations and definitions.  
  
NOTE: The RFP preparer may view or hide the criteria notes in this PTS section by modifying the WORD preferences for "Hidden text". To view the criteria notes, choose "File" then "Option". Click "Display" then check the "Hidden text" box under "Always show these formatting marks on the screen". In the same section, check the box for "Print hidden text" under "Printing options" to print the criteria notes.  
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NOTE: The following Table of Contents is for navigation purposes within the document and is not intended to be part of the final edited documents  
  
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**C20 GENERAL**

RFP Part 3 including the Engineering System Requirements (ESR) provide project specific requirements. The RFP Part 4, Performance Technical Sections (PTS) provide generalized technical requirements that apply to multiple facility types and include more requirements than are applicable to any one project. Therefore, only the RFP Part 4 requirements that apply to the project and further define the RFP Part 3 project specific requirements are required.

**C20 1.1 DESIGN GUIDANCE**

Provide the design and installation in accordance with the following references. This Performance Technical Specification (PTS) adds clarification to the fundamental requirements contained in the following Government Standards. The general requirements of this PTS section are located in PTS Section Z10, *General Performance Technical Specification*.

Industry standards, codes, and government standards that are referenced in the section text that are not found in the [Unified Master Reference List (UMRL)](http://www.wbdg.org/ffc/dod/unified-master-reference) in the [Federal Facility Criteria (FFC)](http://www.wbdg.org/ffc/federal-facility-criteria) at the [Whole Building Design Guide (WBDG)](http://www.wbdg.org/) website, are listed below for basic designation identification. Comply with the required and advisory portions of the current edition of the standard at the time of contract award.

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NOTE: Edit the following list of industry and government standards to coordinate with the section text additions and deletions. List all industry and government standards in the following two paragraphs that are indicated in the section text that are not listed in the UMRL.  
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**C20 1.1.1 Industry Standards and Codes**

AISC American Institute of Steel Construction

**C20 1.1.2 Government Standards**

UNIFIED FACILITIES CRITERIA (UFC)

|  |  |
| --- | --- |
| UFC 1-200-01 | DoD Building Code (General Building Requirements)(A reference in this PTS section to UFC 1-200-01 requires compliance with the Tri-Service Core UFCs that are listed therein, which includes the following significant UFC(s):  UFC 3-101-01 Architecture  UFC 1-200-02 High Performance and Sustainable Building Requirements) |

**C20 1.2 PERFORMANCE VERIFICATION AND ACCEPTANCE TESTING**

Provide verification of satisfactory stair performance via Performance Verification Testing, as detailed in this section of the RFP.

**C20 1.2.1 Field Testing for Concrete**

Field Quality Control Test Reports to be submitted to Designer of Record (DOR) must comply with American Concrete Institute (ACI) 301. If concrete is found to be below the strength required in the tests, remove and replace that concrete and all associated building components at no additional cost to the Government.

**C20 1.3 DESIGN SUBMITTALS**

Provide design submittals in accordance with PTS Section Z10, *General Performance Technical Specifications*, Part 2 Section 01 33 10.05 20, *Design Submittal Procedures*, Facilities Criteria (FC) 1-300-09N, *Navy and Marine Corps Design Procedures,* and UFC 3-101-01, *Architecture*.

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NOTE: NAVFAC has made every effort to use commercial standards in the PTS sections. This PTS section is designed to only use commercial standards. If project requirements dictate the use of a UFGS sections as a standard, add a paragraph here listing the required UFGS section. State in the paragraph that the DOR must edit this UFGS section in accordance with PTS Z10 and submit it as a part of the design submittal.  
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**C20 1.4 CONSTRUCTION SUBMITTALS**

Submit construction submittals in accordance with PTS Section Z10, *General Performance Technical Specification*. In addition to the Z10 requirements the Designer of Record (DOR) must approve the following construction submittals as a minimum:

Stairs, handrails.

**C2010 STAIR CONSTRUCTION**

**C201001 INTERIOR AND EXTERIOR STAIRS**

Provide primed and painted steel stairs with concrete filled pans or cast-in-place concrete stairs for industrial and commercial construction. Design load must not be less than 100 PSF (4.8 kPa) for live load, and 300 pounds (136 kg) for concentrated loads. Required means of egress stairs must conform to to National Fire Protection Association (NFPA) 101. Provide steel guard and handrails.

**C201001 1.1 STEEL STAIRS**

Design must conform to AISC S335 or AISC S342L.

**C201001 1.1.1 Materials**

a. Structural Carbon Steel - American Society for Testing and Materials (ASTM) A 36/A 36M

b. Structural Tubing - ASTM A 500

c. Steel Pipe - ASTM A 47

d. Gratings - Gray cast iron ASTM A 48, Class 40

e. Metal plank grating, non-slip requirement, FS RR-G-1602 aluminum ASTM B 209, 6061-T6; steel ASTM A 653/ A 653M, G90.

f. Floor Plates, Patterned - ASTM A 786/A 786M, 14 gage.

g. Anchor Bolts - ASTM A 307

h. Galvanized Structural Steel - All steel exposed to the environment or direct water contact must be galvanized in accordance with ASTM A 123 /A123M, ASTM A153/A153M, and ASTM A653/A653M, Z275 (G90) coating. Galvanize all components after fabrication in accordance with ASTM A385. Fabricate all steel components in the largest units practical using bolted connections for field assembly. Repair damage to, or voids in, galvanizing in accordance with ASTM A780, Annex A1 or Annex A3.

**C201001 1.2 ALUMINUM ALLOY PRODUCTS**

Conform to ASTM B 209 for sheet plate, ASTM B 221 for extrusions and ASTM B 26/B 26M or ASTM B 108 for castings. Aluminum extrusions must be at least 1/8-inch (3.2 mm) thick and aluminum plate or sheet at least 0.050 inch (1.27 mm) thick.

**C201001 1.3 FINISHES**

**C201001 1.3.1 Galvanizing**

Hot-dip galvanizing: ASTM A 123/A123M, ASTM A 153/A 153M or ASTM A 653/A 653M, G90, as applicable.

**C201001 1.3.2 Aluminum Finishes**

Protect by plating, Class I anodic coatings, or 70% polyvinylidene fluoride organic coatings. See PTS Section C30, *Interior Finishes*, for additional coatings/finish information.

**C201001 1.3.3 Safety Treads**

NAAMM BG steel, Type W (welded).

**C201001 1.3.4 Other Coatings**

See PTS Section C30, *Interior Finishes*, for painted finishes.

**C201001 1.4 CONCRETE STAIRS / STEPS**

Provide interior or exterior concrete steps and stair with non-slip finish. For interior stairs, provide rubber or other finish treads. For exterior stairs, provide cast-in-place abrasive nosing. Provide steel guard and handrails as necessary. Fire stairs must comply with NFPA 101.

**C201001 1.4.1 Materials**

a. Concrete - ACI 211.1, ACI 301/301M, and ACI 318/318M, with a compressive strength of 3,000 psi (20,680 kPa) or greater. Concrete Mix Design shall be suitable for the job conditions.

b. Reinforcements - Bars, fabrics, connectors, and chairs must be galvanized.

c. Reinforcing Bars - ACI 301/301M

d. Welded Wire Fabric - ASTM A 185 or ASTM A 497

e. Cast Aluminum Safety Nosings – For exterior concrete stairs, provide safety nosings of cast aluminum with abrasive surfaces or with abrasive inserts.

**C201001 1.5 WOOD STAIRS**

Wood stairs area only permitted for residential construction. Provide wood treads of minimum 1-1/4 inch thickness, of clear red or white oak. Risers must be nominal one-inch finish lumber. Provide natural finish equivalent to one coat of sealer and two coats of varnish on all exposed surfaces.

**C201002 FIRE ESCAPE STAIRS**

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NOTE: Do not use fire escape stairs in new construction. Fire escape stairs must not constitute any of the required means of egress, with exception granted to some existing buildings by the NFPA. New fire escape stairs are only permitted to be erected on existing buildings where the authority having jurisdiction has determined that outside stairs are impractical.  
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Design fire escapes of the type and arrangement to conform to Fire Escape Stairs, of NFPA 101, *Life Safety Code*. Escape stairs must be of steel or aluminum, conforming to the requirements of this specification section.

**C201090 STAIR HANDRAILS, GUARDRAILS, AND ACCESSORIES**

**C201090 1.1 HANDRAILS**

Design handrails in accordance with the International Building Code (IBC), except delete the handrail design load reduction code exceptions for residential, prisons, industrial, high hazard, and storage facilities. NAAMM Pipe Railing Systems Manual, provide the same size rail and post. Provide series 300 stainless steel pipe collars. Factory coat all metal railings (except for ornamental metals such as brass, bronze, stainless steel, and nickel-silver) with a high performance coating in accordance with American Architectural Manufacturers Association (AAMA) 2605, with a minimum coating thickness of 1.2 mils unless otherwise noted.

**C201090 1.1.1 Steel Handrails**

Provide steel handrails, including inserts in concrete, steel pipe conforming to ASTM A 53 or structural tubing conforming to ASTM A 500, Grade A or B of equivalent strength. Railings must be hot-dip galvanized and shop painted for exterior applications and primed and shop painted for interior applications. Railing may be unpainted hot-dip galvanized in industrial areas.

**C201090 1.1.2 Aluminum Handrails**

Provide aluminum pipe railing conforming to ASTM B 429 or square aluminum semi-hollow tube conforming to ASTM B 221. Railings must be coated with a high performance coating or anodized in accordance with AAMA 611, Class I.

**C201090 1.1.3 Ornamental Handrails**

Provide ornamental railings. Provide anchorage and fasteners as recommended by the product manufacturer. Railing system must conform to ASTM E 985, minimum concentrated test load requirement.

**C201090 1.1.4 Glass Handrails**

Provide glass railings consisting of continuous 1/2-inch (13 mm) beveled tempered glass structural balusters with continuous railing cap and bottom shoe molding. Railing cap and shoe molding must be 6063-T52 aluminum, type 304 stainless steel, brass, or bronze.

**C201090 1.1.5 Wood Handrails**

Wood handrails area only permitted for residential construction. Provide wood handrails of pre-finished natural hardwood. Wood must be coated with hard acrylic finish to withstand indentations.

**C201090 1.1.6 Fiber Reinforced Plastic (FRP) Handrails**

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 NOTE: FRP handrails are only an option for mechanical mezzanine, utility or like construction only.  
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Provide FRP handrail structural shapes manufactured by the pultrusion process with qualities, quantities, properties, arrangements and dimensions as necessary to meet the design requirements in accordance with American Society of Civil Engineers (ASCE) 7,29 Code of Federal Regulations (CFR) 1910.23, NFPA 101. Provide integral UV inhibitors within the resin, synthetic surfacing veil to help produce a resin rich surface, and UV resistant coating.

**C201090 1.2 METAL LADDERS**

**C201090 1.2.1 Metal Ladders**

Provide vertical ladders conforming to Section 7 of 29 CFR 1910.27.

**C201090 1.2.2 Installation**

Offset distance from the rungs to the finished wall surface not less than 7 inches (175 mm). Provide heavy clip angles riveted or bolted to the stringer and drilled for not less than two 1/2-inch (12 mm) diameter expansion bolts as indicated. Provide intermediate clip angles not over 48 inches (1200 mm) on center.

**C201090 1.2.3 Ladder Cages**

Where the height of the ladder is greater than 20 feet (6000 mm), provide a cage to conform to 29 CFR 1910.27.

a. Cage fabrication – Provide attachments for fastening bands to the side rails of ladders or directly to the structure.

-- End of Section --