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NAVFAC PTS-D20 (December 2018)  
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Preparing Activity: NAVFAC SUPERSEDING PTS-D20 (February 2018)  
  
PERFORMANCE TECHNICAL SPECIFICATION  
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SECTION D20  
  
PLUMBING  
12/18

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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; however, not all requirements and equipment items will be applicable to all projects. In addition, there may be special requirements for a particular project that are not addressed at all. The RFP preparer may have 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 subparagraph numerical extensions (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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**D20 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.

**D20 1.1 NARRATIVE**

Use this section in conjunction with all parts of the Design Build (D/B) Request for Proposal (RFP) to determine the full requirements of this solicitation.

This section includes the construction of interior plumbing systems. This section covers installations inside the facility and out to the five foot line. See Section G30, *Site Civil/Mechanical Utilities*, for continuation of systems beyond the five foot line.

**D20 1.2 PLUMBING 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*.

**D20 1.2.1 Government Standards**

Federal Energy Management Program (FEMP)

UNIFIED FACILITIES CRITERIA (UFC)

|  |  |
| --- | --- |
| UFC 1-200-01 | DoD Building Code (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 3-401-01, Mechanical Engineering UFC 3-420-01, Plumbing Systems) |
| UFC 1-200-02 | High Performance and Sustainable Building Requirements |

**D20 1.3 DESIGN SUBMITTALS**

Submit design submittals in accordance with Z10, *General Performance Technical Specifications*, Part 2 Section 01 33 10.05 20, *Design Submittal Procedures*, FC 1-300-09N, *Navy and Marine Corps Design Procedures*, and UFC 3-401-01, *Mechanical Engineering*.

**D20 1.4 CONSTRUCTION SUBMITTALS**

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

Fixtures, equipment, and OMSI information for all equipment and fixtures.

**D20 1.5 QUALITY CONTROL**

Upon completion of the installation test all systems in accordance with the IPC.

**D2010 PLUMBING FIXTURES**

Provide EPA's "WaterSense" labeled fixtures where available.

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NOTE: Coordinate with the ESR to include only the appropriate fixtures for the facility. Verify requirements for additional plumbing fixtures, such as laundry sinks, garbage disposals, grease traps, and other special features. Provide additional paragraphs as necessary for these items.  
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**D201001 WATER CLOSETS**

**D201001 1.1 FLUSH VALVE WATER CLOSETS**

ASME A112.19.2, white vitreous china, siphon jet. Provide ASME A112.19.5 trim. Provide self-closing metering type flush valve, unless automatic flush control is specified in the ESR Section D20. Automatic flush control must conform to UL 1951 and ASSE 1037. Automatic flushing systems to consist of solenoid-activated valves with light beam sensors and include an override pushbutton. Flush valve not to exceed 1.28 GPF (4.8 LPF). Mount handicapped fixtures at a height and provide appurtenances in accordance with ABA Standards.

**D201001 1.2 DUAL FUNCTION FLUSH VALVE WATER CLOSETS**

ASME A112.19.2, white vitreous china, siphon jet. Provide ASME A112.19.5 trim. Provide self-closing metering type dual function flush valve, unless automatic flush control is specified in the ESR Section D20. Automatic flush control must conform with UL 1951 and ASSE 1037. Automatic flushing systems to consist of solenoid-activated valves with light beam sensors and include an override pushbutton. Dual function flush valve must provide a flush of 0.8 to 1.1 GPF (3.0 to 4.2 LPF) or 1.28 GPF (4.8 LPF). Maximum flush volume not to exceed 1.28 GPF (4.8 LPF). Mount handicapped fixtures at a height and provide appurtenances in accordance with ABA Standards.

**D201001 1.3 FLUSH TANK WATER CLOSETS**

ASME A112.19.2, white vitreous china, siphon jet. EPA "WaterSense" labeled. Provide ASME A112.19.5 trim. Water flushing volume of the water closet not to exceed 1.28 GPF (4.8 LPF). Mount handicapped fixtures at a height and provide appurtenances in accordance with ABA Standards.

**D201001 1.4 DUAL FUNCTION FLUSH TANK WATER CLOSETS**

ASME A112.19.2, white vitreous china, siphon jet. Provide ASME A112.19.5 trim. Dual function flush tank water closet providing a dual flush of 0.8 to 1.1 GPF (3.0 to 1.6 LPF) or 1.28 GPF (4.8 LPF). Maximum flush tank volume not to exceed 1.28 GPF (4.8 LPF). Mount handicapped fixtures at a height and provide appurtenances in accordance with ABA Standards.

**D201002 URINALS**

**D201002 1.1 FLUSH VALVE URINALS**

ASME A112.19.2, white vitreous china, wall-mounted, wall outlet, siphon jet, integral trap, extended side shields. EPA "WaterSense" labeled. Provide large diaphragm (not less than 2.625 inches (66 mm) upper chamber inside diameter at the point where the diaphragm is sealed between the upper and lower chambers) flush valve of chrome plated cast brass conforming to ASTM B 584, including vacuum breaker and angle (control-stop) valve. Maximum flush valve volume not to exceed 0.5 gallons per flush (1.9 lpf). Provide ASME A112.19.5 trim and ASME 112.6.1M concealed chair carriers. Provide self-closing metering type flush valve, unless automatic flush control is specified in the ESR Section D20. Automatic flush control in conformance with UL 1951 and ASSE 1037. Automatic flushing systems to consist of solenoid-activated valves with light beam sensors and include an override pushbutton. Select and install urinals and appurtenances in accordance with the ABA Standards.

**D201002 1.2 WATERLESS URINALS**

ASME A112.19.2, white vitreous china, wall-mounted, wall outlet, non-water using, integral drain line connection, with sealed replaceable cartridge or integral liquid seal trap insert. The urinal and trap assembly must maintain a sufficient barrier of a biodegradable immiscible liquid to provide the trap seal and inhibit the backflow of sewer gases. For urinals that use a replaceable cartridge, provide four additional cartridges for each urinal installed. Provide an additional quart of biodegradable liquid for each urinal installed. Provide ASME A112.6.1M concealed chair carriers. Install and test in accordance with the manufacturers’ recommendations. Drain lines that connect to the urinal outlet must not be made of copper tube or pipe. Select and install urinal and appurtenances in accordance with ABA Standards. Slope the sanitary sewer branch line for waterless urinals a minimum of 1/4-inch per foot. Provide manufacturer's operating manual and on-site training for the proper care and maintenance of the urinal.

**D201003 LAVATORIES**

**D201003 1.1 COUNTERTOP LAVATORIES**

Unless integral bowl is specified elsewhere, lavatories to be white, ASME A112.19.2 vitreous china lavatories with minimum dimensions of 19 inches (483 mm) wide x 18 inches (457 mm) front to rear, and self-rimming type. Provide ASME 112.18.1 copper alloy centerset faucets unless self closing metering or automatic control is specified in ESR section D20. Automatic faucet systems to consist of solenoid-activated valves with light beam sensors and include an override pushbutton. Provide EPA "WaterSense" labeled faucets. Provide with aerator, adjustable P-traps, and perforated grid strainers, unless pop-up drain fittings are specified in ESR section D20.

**D201003 1.2 WALL-MOUNTED LAVATORIES**

ASME A112.19.1, white enameled cast-iron or ASME A112.19.2 white vitreous china with ASME A112.6.1M concealed arm carrier support, with minimum dimensions of 19 inches wide by 18 inches (483 mm wide by 457 mm) front to rear. Provide ASME 112.18.1 copper alloy centerset faucets unless self closing metering or automatic control is specified in ESR section D20. Automatic faucet systems to consist of solenoid-activated valves with light beam sensors and include an override pushbutton. Provide EPA "WaterSense" labeled faucets. Provide with aerator, adjustable P-traps, and perforated grid strainers, unless pop-up drain fittings are specified in ESR section D20.

**D201003 1.3 HANDICAPPED LAVATORIES**

Same as Paragraphs 1.1 or 1.2, except height and appurtenances to be in accordance with ABA Standards.

**D201004 SINKS**

**D201004 1.1 COUNTERTOP SINKS**

ASME A112.19.3 sink, 20 gage stainless steel with integral mounting rim, minimum dimensions of 33 inches (840 mm) wide for two compartment or 21 inches (560 mm) wide for one compartment by 21 inches (560 mm) front to rear, with ledge back and undersides coated with sound dampening material. Provide top-mounted ASME A112.18.1 copper alloy faucets, swing spout with aerator, and stainless steel drain outlets with cup strainers. Provide adjustable P-trap with drain piping to vertical vent stack. If specified in ESR section D20, provide UL 430 waste disposer unit in right compartment.

**D201004 1.2 SERVICE SINKS**

ASME A112.19.1, white enameled cast-iron or ASME A112.19.2 white vitreous china, wall mounted and floor supported by wall outlet cast-iron P-trap, minimum dimensions of 22 inches (560 mm) wide by 20 inches (508 mm) front to rear with 10 inch (254 mm) splashback, and stainless steel rim guard. Provide ASME A112.18.1 copper alloy back-mounted combination faucets with vacuum breaker and 0.75 inch (20 mm) external hose threads.

**D201004 1.3 MOP SINKS**

Pre-cast terrazzo floor-mounted mop sink, 36 inches x 36 inches x 12 inches (914 mm x 914 mm x 305 mm), made of marble chips cast in white Portland cement to a compressive strength of not less than 3000 PSI (20.7 mPa) 7 days after casting. Provide brass body drains with nickel bronze strainers cast integral with terrazzo. Provide stainless steel rim guard for mop sink. Provide chrome-plated exposed hot and cold water faucets ASME A112.18.1 wall-mounted copper alloy faucets swing spout with 3/4 inch (20 mm) hose connection, vacuum breaker, and pail hook. Provide mop hanger on wall above sink suitable for four mops.

**D201006 DRINKING FOUNTAINS AND COOLERS**

**D201006 1.1 DRINKING FOUNTAINS**

Wall mounted drinking fountain, constructed of white enameled cast iron with bubbler and push button control. Mount handicapped fixture at a height and provide appurtenances in accordance with ABA Standards.

**D201006 1.2 ELECTRIC WATER COOLERS**

AHRI 1010, wall-mounted, bubbler style, air-cooled condensing unit, 8.0 gph (.5 L per second) minimum capacity, stainless steel splash receptor, double wall heat exchanger, and all stainless steel cabinet. Provide ASME A112.6.1M concealed wall hangers with thru-bolts and back plates. Mount handicapped fixture and provide appurtenances in accordance with ABA Standards.

**D2020 DOMESTIC WATER DISTRIBUTION**

**D202001 PIPES & FITTINGS**

**D202001 1.1 COPPER**

Use copper tubing and fittings for pipe sizes 4 inches (100 mm) or smaller. Use type L tubing above ground with solder fittings. For buried piping, use type K tubing with solder fittings.

**D202001 1.2 CHLORINATED POLYVINYL CHLORIDE (CPVC)**

When specified in ESR section D20, provide CPVC pipe, fittings, and solvent cement meeting requirements of ASTM D 2846/D 2846M for sizes 4 inches (100 mm) and smaller. Provide transition union connections or threaded gate valve between metallic piping and CPVC piping.

**D202002 VALVES & HYDRANTS**

**D202002 1.1 VALVES**

Provide valves at water supplies to fixtures and to provide ease of maintenance.

**D202002 1.2 HOSE BIBBS & HYDRANTS**

Use non-freeze wall hydrants where the winter design temperature is at or below freezing. Hose bibbs are acceptable for use elsewhere.

**D202002 1.2.1 Hose bibbs**

Angle type, copper alloy hose bibbs with vacuum breaker.

**D202002 1.2.2 Wall Hydrants**

Non-freeze, ASSE 1019, cast bronze, with vacuum breaker, locking shield and tee-handle.

**D202003 DOMESTIC WATER EQUIPMENT**

**D202003 1.1 BACKFLOW PREVENTERS**

Provide backflow prevention devices that are approved by the State or local regulatory agencies. If there are no State or local regulatory agency requirements, provide backflow prevention devices that are listed by the Foundation for Cross-Connection Control & Hydraulic Research (FCCHR), or any other approved testing laboratory having equivalent capabilities for both laboratory and field evaluation of backflow prevention devices and assemblies. Provide freeze protection for aboveground exterior applications in areas where the winter design temperature is at or below freezing.

**D202003 1.2 WATER HEATERS**

Provide heaters complete with control system, gauges and ASME rated combination pressure and temperature relief valve. Heaters must meet the performance requirements of ASHRAE 90.1-2013 Table 7.8. Automatic storage type heaters must meet the Energy Star product definition specified in https://www.energystar.gov/products/spec and product to be Energy Star certified. For storage type water heaters, provide ASME code stamped tanks for domestic hot water. Lining must meet NSF 61.

**D202003 1.2.1 Electric Water Heaters**

Electric water heaters with double heating element meeting requirements of UL 174 for water heaters with less than 120 gallons of storage and 200,000 btuh input. Provide water heater meeting requirements of UL 1453 for commercial water heaters with 120 gallons of storage or more and 200,000 btuh input or more. Provide water heaters equipped with glass-lined steel tanks, high efficiency type, insulated with polyurethane foam insulation, replaceable anodes, and adjustable range thermostat to allow hot water settings between 90 and 160 degrees F (32 and 71 degrees C). Water heater warranty must be a minimum of 5 years. In accordance with FEMP requirements, heaters with storage capacity of 55 gallons (209 liters) or less and maximum energy input of 12 kW must have a minimum energy factor (EF) of 0.93 or higher and an annual energy usage of 4,721 kWh or less tested in accordance with U.S. Department of Energy (DOE) test procedure (10 CFR 430, Subpart B, Appendix E). Heaters with storage capacity of greater than 55 gallons (209 liters) and maximum energy input of 12 kW must have a minimum energy factor (EF) of 0.92 and an annual energy usage of 4,773 kWh or less tested in accordance with U.S. Department of Energy (DOE) test procedure (10 CFR 430, Subpart B, Appendix E).

**D202003 1.2.2 Gas-Fired Water Heaters**

High efficiency storage type water heaters meeting requirements of CSA/AM Z21.10.1 for water heaters with less than 120 gallons of storage and input ratings of 75,000 btuh or less. Provide water heater meeting requirements of CSA/AM Z21.10.3 for commercial water heaters with 120 gallons of storage or more and input ratings above 75,000 btuh. Water heaters must meet AGA requirements. Provide water heaters equipped with glass-lined steel tanks, polyurethane foam insulation, replaceable anodes, and adjustable range thermostat to allow hot water settings between 110 and 160 degrees F (43 and 71 degrees C). Water heater warranty must be a minimum of 5 years. Provide vent in accordance with NFPA 54.

**D202003 1.2.3 Electric Instantaneous Water Heaters (Tankless)**

UL 499, heater(s) of the modulating, under the sink, point-of-use type. Output temperature must be adjustable from 40 degrees F to 160 degrees F. Heating elements must be field replaceable. Unit(s) must have a minimum 5-year warranty.

**D202003 1.3 PUMPS**

**D202003 1.3.1 Inline Pumps**

In-line circulator for service water distribution system. Factory assembled and tested pumps constructed of materials suitable for hot domestic water service.

**D202003 1.4 EXPANSION TANKS**

Steel expansion tank with potable water rated polypropylene or butyl lined diaphragm at water heater.

**D202003 1.5 WATER METERS**

See PTS G30, Site Civil/Mechanical Utilities, for water meter requirements.

**D202003 1.7 MASTER THERMOSTATIC MIXING VALVES**

ASSE 1017.

**D202004 INSULATION & IDENTIFICATION**

**D202004 1.1 PIPING INSULATION**

Mineral fiber insulation on domestic hot water supply and recirculation piping. Insulate domestic cold water piping with cellular glass insulation.

**D202004 1.2 PIPING & EQUIPMENT IDENTIFICATION**

In addition to the requirements in Section Z10, *General Performance Technical Specification*, provide engraved brass, laminated plastic, or engraved anodized aluminum nameplates for valves. Stop valves in supplies to fixtures will not require nameplates. Identify above ground pipe with the type of service and direction of flow. Letter size, lengths and colors to be in accordance with ANSI A13.1.

**D202005 SPECIALTIES**

**D202005 1.1 VALVE BOXES**

For each buried valve provide cast-iron, ductile-iron box of a suitable size. Provide cast-iron or ductile-iron cover for the box with the word "WATER" cast on the cover.

**D202005 1.2 WATER HAMMER ARRESTORS**

PDI WH 201, water hammer arrestors in lieu of air chambers.

**D202005 1.3 ICEMAKER CONNECTOR BOX**

Recessed wall box fabricated of PVC plastic. Provide bronze shut-off valve.

**D202090 OTHER DOMESTIC WATER SUPPLY**

**D202090 1.1 SUPPORTS**

Provide piping supports. If a supported floor slab is used, support all piping located below the building from the building support slab.

**D202090 1.2 INSPECTIONS**

Prior to initial operation, inspect piping system for compliance with drawings, specifications, and manufacturer's submittals.

**D202090 1.3 DISINFECTION**

Upon completion of the installation, disinfect all systems.

**D202090 1.4 PLUMBING SYSTEMS TESTING**

Upon completion of the installation test all systems per the IPC.

**D2030 SANITARY WASTE**

**D203001 WASTE PIPE & FITTINGS**

**D203001 1.1 PIPING AND FITTINGS**

Cast iron hub and spigot pipe and fittings, rubber compression gasket joints or cast-iron hubless pipe and fittings, CISPI 301 with CISPI 310 couplings. Where indicated in ESR Section D20, plastic PVC or ABS piping, fittings, and solvent cement meeting requirements of ASTM D 2665 or ASTM D 2661 may be provided. Equip plastic piping with approved firestopping devices as required by code.

**D203001 1.2 CLEANOUTS**

Provide cleanouts. Utilize material consistent with the piping system materials. Do not locate sanitary cleanouts within occupied spaces, with the exception of toilet and janitor spaces.

**D203002 VENT PIPE & FITTINGS**

Cast-iron hubless pipe and fittings, CISPI 301 with CISPI 310 couplings. Where indicated in ESR Section D20, plastic PVC or ABS piping, fittings, and solvent cement meeting requirements of ASTM D 2665 or ASTM D 2661. Equip PVC piping with approved firestopping devices as required by code. Single drainage/vent stack systems (such as Philadelphia system) and mechanical air admittance valves are not acceptable.

**D203003 FLOOR DRAINS**

Flush strainer or extended rim type. Provide in mechanical rooms, restrooms, fire pump room, laundry room, and plumbing chase areas. Also provide floor drains in specific areas of subsistence buildings and cold-storage buildings as identified in UFC 3-420-01. Provide floor sinks in kitchens. Provide floor sinks where required for interior air handling unit condensate drains. Install condensate and drain piping to avoid interference with equipment access and prevent trip hazards.

**D203004 SANITARY & VENT EQUIPMENT**

**D203004 1.1 PUMPS**

**D203004 1.1.1 Sump Pumps**

Factory assembled and tested submersible type pumps for operation under water.

**D203004 1.1.2 Sewage Pumps**

FS A-A-50555, single or duplex type to meet demand. For duplex types, provide with automatic controls to alternate the operation from one pump to the other.

**D2040 RAIN WATER DRAINAGE**

**D204001 PIPE & FITTINGS**

Cast iron hubless pipe and fittings, CISPI 301 with CISPI 310 couplings. Where indicated in ESR Section D20, plastic PVC or ABS piping, fittings, and solvent cement meeting requirements of ASTM D 2665 or ASTM D 2661 may be used. Equip PVC piping with approved firestopping devices as required by code.

**D204002 ROOF DRAINS**

ASME A112.6.4, with dome and integral flange. Provide a device for making a watertight connection between roofing and flashing.

**D204003 RAIN WATER DRAINAGE EQUIPMENT**

Where required by building design, provide expansion joint(s) of proper size to receive the conductor pipe. The expansion joint must consist of a heavy cast-iron housing, brass or bronze sleeve.

**D204004 INSULATION & IDENTIFICATION**

Provide flexible elastomeric cellular, faced phenolic foam, or cellular glass insulation on all drainage piping that may be subject to condensation. Provide a vapor retarder. Identify aboveground pipe with the type of service and direction of flow. Letter size, lengths and colors to be in accordance with ANSI A13.1.

**D2090 OTHER PLUMBING SYSTEMS**

**D209001 SPECIAL PIPING SYSTEMS**

**D209001 1.1 NATURAL GAS PIPING**

Conform to requirements of the local natural gas utility and ASME B31.8, *Gas Transmission and Distribution Piping Systems*, for exterior piping. Conform to requirements of NFPA 54, *National Fuel Gas Code*, for interior gas piping. Provide meter and pressure regulator in accordance with the requirements of the local utility. Provide earthquake valve where required by code.

-- End of Section --