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USACE / NAVFAC / AFCEA / NASA UFGS-22 66 53 (August 2008)  
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Preparing Activity: NASA Superseding  
UFGS-22 66 83.00 40 (April 2008)

UNIFIED FACILITIES GUIDE SPECIFICATIONS

References are in agreement with UMRL dated April 2009

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SECTION TABLE OF CONTENTS

DIVISION 22 - PLUMBING

SECTION 22 66 53

LABORATORY CHEMICAL-WASTE AND VENT PIPING

08/08

PART 1 GENERAL

- 1.1 REFERENCES
- 1.2 SUBMITTALS
- 1.3 GENERAL REQUIREMENTS

PART 2 PRODUCTS

- 2.1 BOROSILICATE GLASS, TYPE BSG
- 2.2 HIGH-SILICON CAST IRON, TYPE HSCI
- 2.3 POLYETHYLENE DRAIN, WASTE, AND VENT, TYPE PE-DWV
- 2.4 POLYPROPYLENE DRAIN, WASTE, AND VENT, TYPE PP-DWV
- 2.5 POLYVINYLCHLORIDE DRAIN, WASTE, AND VENT, TYPE PVC-DWV

PART 3 EXECUTION

- 3.1 INSTALLATION AND TESTING

-- End of Section Table of Contents --

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### SECTION 22 66 53

#### LABORATORY CHEMICAL-WASTE AND VENT PIPING 08/08

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NOTE: This specification covers the requirements for various corrosion-resistant chemical-waste drainage systems.

Select required system materials and delete all others. This section should be used in conjunction with Section 23 05 15 COMMON PIPING FOR HVAC.

Edit this guide specification for project specific requirements by adding, deleting, or revising text. For bracketed items, choose applicable items(s) or insert appropriate information.

Remove information and requirements not required in respective project, whether or not brackets are present.

Comments and suggestions on this guide specification are welcome and should be directed to the technical proponent of the specification. A listing of technical proponents, including their organization designation and telephone number, is on the Internet.

Recommended changes to a UFGS should be submitted as a Criteria Change Request (CCR).

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## PART 1 GENERAL

### 1.1 REFERENCES

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NOTE: This paragraph is used to list the publications cited in the text of the guide specification. The publications are referred to in the text by basic designation only and listed in this paragraph by organization, designation, date, and title.

Use the Reference Wizard's Check Reference feature when you add a RID outside of the Section's

Reference Article to automatically place the reference in the Reference Article. Also use the Reference Wizard's Check Reference feature to update the issue dates.

References not used in the text will automatically be deleted from this section of the project specification when you choose to reconcile references in the publish print process.

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The publications listed below form a part of this specification to the extent referenced. The publications are referred to within the text by the basic designation only.

ASME INTERNATIONAL (ASME)

ASME B16.12 (1998; R 2006) Cast Iron Threaded Drainage Fittings

ASTM INTERNATIONAL (ASTM)

ASTM A 518/A 518M (1999; R 2008) Standard Specification for Corrosion-Resistant High-Silicon Iron Castings

ASTM C 1036 (2006) Standard Specification for Flat Glass

ASTM D 2447 (2003) Standard Specification for Polyethylene (PE) Plastic Pipe, Schedules 40 and 80, Based on Outside Diameter

ASTM D 2665 (2009) Standard Specification for Poly(Vinyl Chloride) (PVC) Plastic Drain, Waste, and Vent Pipe and Fittings

ASTM D 4101 (2008) Standard Specification for Polypropylene Injection and Extrusion Materials

ASTM D 6927 (2006) Standard Test Method for Marshall Stability and Flow of Bituminous Mixtures

1.2 SUBMITTALS

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NOTE: Review Submittal Description (SD) definitions in Section 01 33 00 SUBMITTAL PROCEDURES and edit the following list to reflect only the submittals required for the project. Submittals should be kept to the minimum required for adequate quality control.

A "G" following a submittal item indicates that the submittal requires Government approval. Some submittals are already marked with a "G". Only delete an existing "G" if the submittal item is not complex and can be reviewed through the Contractor's Quality Control system. Only add a "G" if the

submittal is sufficiently important or complex in context of the project.

For submittals requiring Government approval on Army projects, a code of up to three characters within the submittal tags may be used following the "G" designation to indicate the approving authority. Codes for Army projects using the Resident Management System (RMS) are: "AE" for Architect-Engineer; "DO" for District Office (Engineering Division or other organization in the District Office); "AO" for Area Office; "RO" for Resident Office; and "PO" for Project Office. Codes following the "G" typically are not used for Navy, Air Force, and NASA projects.

Choose the first bracketed item for Navy, Air Force and NASA projects, or choose the second bracketed item for Army projects.

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Government approval is required for submittals with a "G" designation; submittals not having a "G" designation are [for Contractor Quality Control approval.][for information only. When used, a designation following the "G" designation identifies the office that will review the submittal for the Government.] Submit the following in accordance with Section 01 33 00 SUBMITTAL PROCEDURES:

#### SD-02 Shop Drawings

Submit [Installation Drawings](#) in accordance with paragraph entitled, "General Requirements," of this section.

#### SD-03 Product Data

Submit manufacturer's catalog data for the following items:

[Borosilicate Glass Materials](#)  
[High-Silicon Cast Iron Material](#)  
[Polyethylene Material](#)  
[Polypropylene Material](#)  
[Polyvinylchloride Material](#)

#### SD-06 Test Reports

Submit [Test Reports](#) in accordance with paragraph entitled, "Installation and Testing," of this section.

#### SD-07 Certificates

Submit [Listing of Product Installations](#) in accordance with paragraph entitled, "Installation and Testing," of this section.

Submit certificates for the following items showing conformance with the referenced standards contained in this section.

[Borosilicate Glass Materials](#)  
[High-Silicon Cast Iron Material](#)  
[Polyethylene Material](#)

Polypropylene Material  
Polyvinylchloride Material

1.3 GENERAL REQUIREMENTS

Submit [Installation Drawings](#) for chemical-waste drainage systems in accordance with the manufacturer's recommended instructions.

PART 2 PRODUCTS

2.1 BOROSILICATE GLASS, TYPE BSG

[Borosilicate Glass Materials](#) for drain, waste, and vent piping systems must be tempered and annealed in conformance with [ASTM C 1036](#), coupling per AISI Type 304 corrosion-resistant steel lined with Buna-N resilient member supporting a tetrafluoroethylene liner and liner the only material wetted by waste stream. Piping class to be BSG-1.

[Vent-system materials [1800 millimeter 6 feet](#) and higher above the floor must be Type PP or PVC with extra-heavy Type HSCI extension through roof.]

2.2 HIGH-SILICON CAST IRON, TYPE HSCI

For [High-Silicon Cast Iron Material](#) ([ASTM A 518/A 518M](#)) drain, waste, and vent piping systems use bell-and-spigot or beaded-end straight barrel, extra heavy, acid-resistant soil pipe containing not less than 14-1/2 percent silicon. For joint seals use lead and acid-resistant packing. Use mechanical joint coupling constructed of AISI Type 304 corrosion-resistant steel with chloroprene resilient member supporting a tetrafluoroethylene liner. Liner must be the only material wetted by waste stream. Tighten nut to a minimum of [12 newton-meter 9 foot-pounds](#).

[Vent-system materials [1800 millimeter 6 feet](#) and higher above the floor must be Type PP or Type PVC with extra-heavy Type HSCI extensions through roof.]

2.3 POLYETHYLENE DRAIN, WASTE, AND VENT, TYPE PE-DWV

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NOTE: This specification for polyolefin thermoplastic drain, waste, and vent system materials provides for polyethylene use as a single material uniformly throughout the system or as a mixture of compatible materials. Materials include P-traps, drum traps, cup sinks, waste drains, downspouts, stand pipes, etc., as indicated.

PE materials are not recommended for service in subfreezing temperatures.

Type PE materials are prone to environmental-stress cracking. Ultraviolet light degrades PE materials.

Maximum continuous duty of type PE-DWV materials must not exceed [82 degrees C 180 degrees F](#). In multistory buildings, consider type HSCI or Type BSG mains or stacks.

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For Polyethylene Material drain, waste, and vent piping systems use products manufactured from polyethylene (PE) olefin resins in conformance with ASTM D 2447 and ASME B16.12 for applicable dimensions and configurations, Schedule 40, Type PE-2306, black, specifically suitable for joining by fusion of interfaces into a homogeneous mass at high temperatures. Threaded assemblies must be molded. No thread cutting will be permitted.

Vent extensions through the roof must be extra-heavy Type HSCI.

[Selected drainage-system components may be manufactured from polypropylene (PP) materials, provided proposed means and methods of connection are recommended by the manufacturing source.]

#### 2.4 POLYPROPYLENE DRAIN, WASTE, AND VENT, TYPE PP-DWV

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**NOTE:** This specification for polyolefin thermoplastic drain, waste, and vent systems materials provides for pp use as a single material uniformly throughout the system or as a mixture of compatible materials. Materials include P-traps, drum traps, cup sinks, waste drains, downspouts, stand pipes, etc., as indicated.

Maximum continuous duty of type PP-DWV materials must not exceed 82 degrees C 180 degrees F. In multistory buildings, consider Type HSCI or Type BSG for mains or stacks.

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For Polypropylene Material drain, waste, and vent piping systems use products manufactured from Type I - 19509, black olefin resins conforming to ASTM D 4101 and tested in accordance with applicable provisions of ASTM D 2447. Comply with applicable provisions of ASME B16.12 for material dimensions and configurations.

Pipe-wall thickness must be Schedule 40 with minimum burst pressure when tested in accordance with ASTM D 6927 for 60 to 90 seconds, as follows:

Size (millimeter) DN	40	50	80	100
Burst Pressure (kilopascal)	4585	380	3650	3100
Size (inches)	1-1/2	2	3	4
Burst Pressure (pounds per square inch)	665	550	530	450

PP materials must be specifically suitable for joining interfaces into a homogeneous mass by fusion at high temperatures. Threaded assemblies must be molded. No thread cutting will be permitted.

Vent extensions through the roof must be extra-heavy Type HSCI.

[For selected drainage system components use products manufactured from PE materials when so specified, and provided proposed means and methods of connection as recommended by the manufacturing source.]

## 2.5 POLYVINYLCHLORIDE DRAIN, WASTE, AND VENT, TYPE PVC-DWV

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NOTE: The following specification provides for polyvinylchloride thermoplastic drain, waste, and vent systems materials which include pipe and dwv fittings. P-traps, drum traps, cup sinks, waste drains, downspouts, standpipes, etc., are not covered.

Maximum continuous duty of PVC DWV materials must not exceed 66 degrees C 150 degrees F. In multistory buildings, consider Type HSCI or Type BSG mains or stacks.

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For Polyvinylchloride Material drain, waste, and vent piping-system use materials manufactured from Type I normal impact resins in conformance with ASTM D 2665 and ASME B16.12 for applicable dimensions. Material must be gray and specifically suited for joining socket interfaces into a homogeneous mass by solvent-cement welding.

Fittings must be molded to produce, upon insertion of pipe, an interference fit at approximately 2/3 of the depth of the socket. No thread cutting will be permitted.

Vent extensions through the roof must be extra-heavy type HSCI.

## PART 3 EXECUTION

### 3.1 INSTALLATION AND TESTING

Submit Test Reports consisting of system operation tests for chemical-waste drainage systems.

Within Listing of Product Installations for chemical-waste drainage systems include identification of at least five units, similar to those proposed for use, that have been in successful service for a minimum of five years. Include purchaser, address of installation, service organization, and date of installation.

Install and test equipment in accordance with manufacturer's recommendations.

-- End of Section --