Preparing Activity: NASA

Superseding
UFGS-22 66 53.00 40 (August 2015)
UFGS-22 66 53 (August 2010)

UNIFIED FACILITIES GUIDE SPECIFICATIONS

References are in agreement with UMRL dated July 2023
****

SECTION TABLE OF CONTENTS

DIVISION 22 - PLUMBING

SECTION 22 66 53.00 40

LABORATORY CHEMICAL-WASTE AND VENT PIPING

02/23

PART 1 GENERAL

1.1 REFERENCES
1.2 SUBMITTALS
1.3 QUALITY CONTROL

PART 2 PRODUCTS

2.1 MATERIALS
2.1.1 Borosilicate Glass, Type Bsg
2.1.2 Polyethylene Drain, Waste, and Vent, Type PE-DWV
2.1.3 Polypropylene Drain, Waste, and Vent, Type PP-DWV
2.1.4 Polyvinylchloride Drain, Waste, and Vent, Type PVC-DWV
2.1.5 Chlorinated Polyvinylchloride Drain, Waste, and Vent, Type CPVC-DWV
2.1.6 Polyvinylidene Fluoride Drain, Waste, and Vent, Type PVDF-DWV

PART 3 EXECUTION

3.1 INSTALLATION

-- End of Section Table of Contents --

Preparing Activity: NASA

Superseding
UFGS-22 66 53.00 40 (August 2015)
UFGS-22 66 53 (August 2010)

UNIFIED FACILITIES GUIDE SPECIFICATIONS

References are in agreement with UMRL dated July 2023

SECTION 22 66 53.00 40

LABORATORY CHEMICAL-WASTE AND VENT PIPING
02/23

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

Adhere to UFC 1-300-02 Unified Facilities Guide Specifications (UFGS) Format Standard when editing this guide specification or preparing new project specification sections. Edit this guide specification for project specific requirements by adding, deleting, or revising text. For bracketed items, choose applicable item(s) or insert appropriate information.

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

Comments, suggestions and recommended changes for this guide specification are welcome and should be submitted as a Criteria Change Request (CCR).

PART 1 GENERAL

NOTE: Select required system materials and delete all others. This section should be used in conjunction with Section 22 00 00 PLUMBING, GENERAL PURPOSE.

1.1 REFERENCES

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

and title.

Use the Reference Wizard's Check Reference feature when you add a Reference Identifier (RID) outside of the Section's Reference Article to automatically place the reference in the Reference Article. Also use the Reference Wizard's Check Reference feature to update the issue dates.

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

****

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.

AMERICAN SOCIETY OF MECHANICAL ENGINEERS (ASME)

ASME B16.12	(2019) Cast Iron Threaded Drainage Fittings

ASTM INTERNATIONAL (ASTM)

ASTM C1036	(2021) Standard Specification for Flat Glass
ASTM D2321	(2020) Standard Practice for Underground Installation of Thermoplastic Pipe for Sewers and Other Gravity-Flow Applications
ASTM D2447	(2003) Standard Specification for Polyethylene (PE) Plastic Pipe, Schedules 40 and 80, Based on Outside Diameter
ASTM D2665	(2014) Standard Specification for Poly(Vinyl Chloride) (PVC) Plastic Drain, Waste, and Vent Pipe and Fittings
ASTM D3222	(2018a) Standard Specification for Unmodified Poly(Vinylidene Fluoride) (PVDF) Molding Extrusion and Coating Materials
ASTM D4101	(2017) Standard Classification System and Basis for Specification for Polypropylene Injection and Extrusion Materials
ASTM D6927	(2015) Standard Test Method for Marshall Stability and Flow of Bituminous Mixtures
ASTM F493	(2022) Standard Specification for Solvent Cements for Chlorinated Poly (Vinyl Chloride) (CPVC) Plastic Pipe and Fittings
ASTM F1668	(2008) Standard Guide for Construction Procedures for Buried Plastic Pipe

ASTM F2618 (2021) Standard Specification for Chlorinated Poly (Vinyl Chloride) (CPVC) Pipe and Fittings for Chemical Waste Drainage Systems

1.2 SUBMITTALS

****
NOTE: Review Submittal Description (SD) definitions in Section 01 33 00 SUBMITTAL PROCEDURES and edit the following list, and corresponding submittal items in the text, to reflect only the submittals required for the project. The Guide Specification technical editors have classified those items that require Government approval, due to their complexity or criticality, with a "G." Generally, other submittal items can be reviewed by the Contractor's Quality Control System. Only add a “G” to an item, if the submittal is sufficiently important or complex in context of the project.

For Army projects, fill in the empty brackets following the "G" classification, with a code of up to three characters to indicate the approving authority. Codes for Army projects using the Resident Management System (RMS) are: "AE" for Architect-Engineer; "DO" for District Office (Engineering Division or other organization in the District Office); "AO" for Area Office; "RO" for Resident Office; and "PO" for Project Office. Codes following the "G" typically are not used for Navy, Air Force, and NASA projects.

The "S" classification indicates submittals required as proof of compliance for sustainability Guiding Principles Validation or Third Party Certification and as described in Section 01 33 00 SUBMITTAL PROCEDURES.

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

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

SD-02 Shop Drawings

Installation Drawings[; G[, [____]]]

SD-03 Product Data

Borosilicate Glass Materials[; G[, [____]]]

Polyethylene Material[; G[, [____]]]

Polyvinylchloride Material[; G[, [____]]]

Chlorinated Polyvinylchloride Material[; G[, [____]]]

Polyvinylidene Fluoride Material; G

SD-06 Test Reports

Test Reports[; G[, [____]]]

SD-07 Certificates

Listing of Product Installations[; G[, [____]]]

Borosilicate Glass Materials[; G[, [____]]]

Polyethylene Material[; G[, [____]]]

Polypropylene Material[; G[, [____]]]

Polyvinylchloride Material[; G[, [____]]]

Polyvinylidene Fluoride Material; G

1.3 QUALITY CONTROL

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.

PART 2 PRODUCTS

2.1 MATERIALS

2.1.1 Borosilicate Glass, Type Bsg

Provide borosilicate glass materials tempered and annealed in conformance with ASTM C1036. Pipe coupling per AISI Type 304 corrosion-resistant steel lined with Buna-N resilient member supporting a tetrafluoroethylene liner, ensuring that the liner is the only material wetted by waste stream. Verify piping class is BSG-1.

[Provide vent-system materials, 1800 millimeter 6-feet and higher, above the floor of Type PP or PVC with painted extension through roof. Paint the entire interior and exterior of the pipe where surfaces are exposed to ultraviolet light.

]2.1.2 Polyethylene Drain, Waste, and Vent, Type PE-DWV

****

NOTE: This guide 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 can not exceed 82 degrees C 180 degrees F. In multistory buildings, consider type HSCI or Type BSG mains or stacks.

****

For polyethylene material, provide products manufactured from polyethylene (PE) olefin resins in conformance with ASTM D2447 and ASME B16.12. Use Schedule 40, Type PE-2306, black, specifically suitable for joining by fusion of interfaces into a homogeneous mass at high temperatures. Ensure threaded assemblies are molded. No thread cutting is permitted.

Provide painted vent extensions through the roof. Paint the entire interior and exterior of the pipe where surfaces are exposed to ultraviolet light.

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

]2.1.3 Polypropylene Drain, Waste, and Vent, Type PP-DWV

****

NOTE: This guide 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 can not exceed 82 degrees C 180 degrees F. In multistory buildings, consider Type HSCI or Type BSG for mains or stacks.

****

For Polypropylene material, provide products manufactured from Type I - 19509, black olefin resins conforming to ASTM D4101 and tested in accordance with applicable provisions of ASTM D2447. Comply with applicable provisions of ASME B16.12 for material dimensions and configurations.

Ensure pipe-wall thickness is Schedule 40 with minimum burst pressure when tested in accordance with ASTM D6927 for 60 to 90 seconds, as follows:

Size (millimeter)DN	40	50	80	100
Burst Pressure (kilopascal)	4585	3800	3650	3100

Size (inches)	1-1/2	2	3	4
Burst Pressure (pounds per square inch)	665	550	530	450

Provide only PP materials specifically suitable for joining interfaces into a homogeneous mass by fusion at high temperatures, with molded threaded assemblies. No thread cutting is permitted.

Provide painted vent extensions through the roof. Paint the entire interior and exterior of the pipe where surfaces are exposed to ultraviolet light.

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

]2.1.4 Polyvinylchloride Drain, Waste, and Vent, Type PVC-DWV

****

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 can not exceed 66 degrees C 150 degrees F. In multistory buildings, consider Type HSCI or Type BSG mains or stacks.

****

For polyvinylchloride material, provide materials manufactured from Type I normal impact resins in conformance with ASTM D2665 and ASME B16.12 for applicable dimensions. Ensure materials are gray and specifically suited for joining socket interfaces into a homogeneous mass by solvent-cement welding.

Ensure all fittings are molded to produce, upon insertion of pipe, an interference fit at approximately 2/3 of the depth of the socket. No thread cutting is permitted.

Provide painted vent extensions through the roof. Paint the entire interior and exterior of the pipe where surfaces are exposed to ultraviolet light

2.1.5 Chlorinated Polyvinylchloride Drain, Waste, and Vent, Type CPVC-DWV

****

NOTE: The following specification provides for chlorinated polyvinylchloride thermoplastic drain, waste, and vent systems materials which include pipe

and dwv fittings in non-pressure use. P-traps, drum traps, cup sinks, waste drains, downspouts, standpipes, etc., are not covered.

Maximum continuous duty of CPVC DWV materials can not exceed 66 degrees C 220 degrees F. In multistory buildings, consider Type HSCI or Type BSG mains or stacks.

****

For chlorinated polyvinylchloride material, provide materials manufactured from Type IV Grade 1 materials with a minimum cell classification of ASTM Cell Class 23447. Ensure pipe and fittings conform to ASTM F2618. Pipe is Schedule [40][80]. For solvent welded joints, ensure solvent conforms to ASTM F493.

2.1.6 Polyvinylidene Fluoride Drain, Waste, and Vent, Type PVDF-DWV

****

NOTE: The following specification provides for Polyvinylidene Fluoride Drain, waste, and vent systems materials in non-pressure use. P-traps, drum traps, cup sinks, waste drains, downspouts, standpipes, etc., are not covered

Maximum continuous duty of PVDF DWV materials can not exceed 100 degrees C (212 degrees F). In multistory buildings, consider Type HSCI or Type BSG mains or stacks.

****

For polyvinylidene fluoride material, provide UL listed 94-VO noncombustible plain end pipe. Ensure pipe and drainage pattern fittings conform to ASTM D3222. Pipe is Schedule 40. Use [Socket fusion] [Electrofusion] joints.

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

]PART 3 EXECUTION

3.1 INSTALLATION

Submit installation drawings for chemical-waste drainage systems in accordance with the manufacturer's recommended instructions.

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

Install buried pipe in accordance with ASTM D2321 and ASTM F1668.

Submit test reports consisting of system operation tests for chemical-waste drainage systems.

-- End of Section --