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Approved Materials List

Updated Through November 2025

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INTRODUCTION

Notes

1. Questions or comments regarding the Approved Materials List should be directed to Loudoun Water's Product Review Committee at productreviews@loudounwater.org.

2. Loudoun Water's Product Review Committee will evaluate, in accordance with established procedures, new products and materials to determine their suitability for use as part of the water and/or sanitary sewer systems.

3. All standards referenced in the Approved Materials List shall be the latest version.

4. Grandfathered Products -- Listing of an approval date of October 1999 or prior indicates that the product was in use by Loudoun Water before publication of the Approved Materials List.

5. Design Changes -- After an item has been approved by the Product Review Committee, the manufacturer, or representative, shall inform the Committee, in writing, of any modifications in design or material. Such changes may require further evaluation resulting in a change to approval status.

6. Withdrawal of Approval -- Loudoun Water may withdraw any approval as a result of design change, field observation, testing, product failure, or other factors which, in the Committee's opinion, warrant such withdrawal.

Product Review Procedures

Making Application

To initiate consideration of a material that is not listed, please follow these procedures.

1. All requests for consideration of new products shall be sent to the Product Review Coordinator, via the Loudoun Water website, https://www.loudounwater.org/developers-new-construction/product-review-committee.

2. The applicant will be responsible for providing the Product Review Coordinator with all information and samples needed to evaluate the product. Applications shall be made in electronic format. Requests shall include all applicable items below, but shall not be limited to:

    - Identify which section of the Loudoun Water approved materials list in which the product applies.

    - A list of all standards (ANSI/AWWA, ASTM, etc.) to which the product conforms, and any certifications (UL, ASSE, etc.) of the product.

    - Adequate shop drawings and design information.

- Brochures and/or other product information.
- Location of the manufacturer's plant.
- Location of distribution point and the nearest retail outlet.
- Information about availability of spare parts and service.
- Terms of warranty.
- A 5-year history of the product, documenting its performance.
- User references, with contact persons and telephone numbers.

3. Whenever possible, a committee meeting will be scheduled within 60 days of the receipt of a complete request.

Deliberation

The Product Review Committee makes determinations by consensus, based upon the research and experience of its members, and other staff participating in the deliberation. Sources of information that are often consulted include:

- presentations by manufacturers' representatives
- factory visits
- visits to active installations, or facilities in service
- interviews with contractors, distributors, consulting engineers, and the staff of other utilities
- trial installations in Loudoun Water's system

Factors that are considered include:

- compatibility of the proposed product with materials already in use
- compliance with applicable standards (e.g. AWWA, ANSI, ASTM, VDOT, and Loudoun Water requirements as listed in the Approved Materials List)
- ease or difficulty of installation, including the need for specialized tools
- market availability of spare parts
- optimization of spare parts inventory
- warranties
- susceptibility to corrosion

- history of the product's performance
- quality controls at the factory, and Loudoun Water's access to verify controls
- life cycle cost
- overall benefit to Loudoun Water, stemming from the requested approval

Committee Determinations

After completion of the evaluation, the Product Review Committee may make one of the following determinations:

1. Approval for Use -- Approval allows use of the product throughout the service areas. All use of the product must be in conformance with all State, County, and Loudoun Water standards, regulations, and policies, in accordance with the manufacturer's specifications, and with good engineering practice.

2. Conditional Approval for Use -- Conditional approval allows use of the product throughout the service areas; however, the product will be reviewed periodically to ensure that no unforeseen installation or maintenance problems have arisen. After a suitable period of field observation, the conditional approval may be upgraded to the "Approval for Use" status. The frequency of review and the length of the field observation period will be determined by the Product Review Committee. If, during the field observation period, problems with the installation, operation, or maintenance of the product are observed, the Product Review Committee may downgrade the status of the product to "Disapproval for Use." All use of the product will be in conformance with all State, County, and Loudoun Water standards, regulations, and policies, with the manufacturer's specifications, and with good engineering practice.

3. Limited Approval for Use -- Approval of a product may be limited to use only in certain sites or projects within Loudoun Water's service areas, or for only specific applications. The Product Review Committee will determine where the product can be used. The product will be reviewed periodically to ensure that no unforeseen installation, operation, or maintenance problems have arisen. After a suitable period of field observation, this approval may be upgraded to "Conditional Approval for Use" or "Approval for Use." The frequency of review and the length of the field observation period will be determined by the Product Review Committee. If, during the field observation period, problems with the installation, operation, or maintenance of the product are observed, the Product Review Committee may downgrade the status of the product to "Disapproval for Use." All use of the product will be in conformance with all State, County, and Loudoun Water standards, regulations, and policies, with the manufacturer's specifications, and with good engineering practice.

4. Disapproval for Use -- Should a product not meet the aforementioned criteria; the Product Review Committee shall disapprove it for use anywhere in Loudoun Water's service areas. Once a product has been given a "Disapproval for Use" status, the Committee shall not review the product again unless significant changes have been made to the product, and/or to the manufacturer's process and practices. The Product Review Committee will not reconsider a disapproved product until at least twelve (12) months from the date of disapproval have passed.

5. Insufficient Information -- Should the committee determine that insufficient information about the product has been received, evaluation of the product shall cease until additional information has been submitted. At that time, the Product Review Coordinator will schedule a new evaluation date for the product.

Resolving Disputes

Any questions or appeals by an applicant should be submitted in writing to the Product Review Coordinator via the Loudoun Water website listed above. The Loudoun Water Project Review Committee will assess the dispute and resolve as necessary.

GENERAL USE ITEMS

Concrete and Mortar

STANDARDS

1. Virginia Department of Transportation Road and Bridge Specification
2. ASTM C33 Concrete Aggregates
3. ASTM C94 Ready-Mix Concrete
4. ASTM C105 Portland Cement

LOUDOUN WATER REQUIREMENTS

1. Class A4 concrete shall be 4,000 psi compressive strength at 28 days. Minimum cement content shall be 6.75 bags per cubic yard. Maximum water content shall be 5.0 gallons per bag. Any VDOT approved supplier and A4 mix design may be used.
2. Class A3 concrete shall be 3,000 psi compressive strength at 28 days. Minimum cement content shall be 6.25 bags per cubic yard. Maximum water content shall be 5.5 gallons per bag. Any VDOT approved supplier and A3 mix design may be used.
3. Class B2 concrete shall be 2,200 psi compressive strength at 28 days. Minimum cement content shall be 5.25 bags per cubic yard. Maximum water content shall be 6.5 gallons per bag. Any VDOT approved supplier and B2 mix design may be used.
4. Use mix with air entraining agent for applications exposed to freeze-thaw cycle.
5. Maximum slump, air content, temperature and mix duration to be within range specified for the selected mix, as specified by the VDOT Road and Bridge Specification.
6. Forms shall be mortar tight, made of wood or other approved materials. Forms shall be smooth and free of holes, dents, or other irregularities.
7. Mortar shall be one part cement to two parts sand (one bag cement to 1.8 cubic feet sand). Add minimum water necessary to create a workable mix.
8. Concrete, grout, and mortar for use in sanitary sewer system is to be made of Type II Portland Cement for sulfate resistance.

Casing and Liner Plate

STANDARDS

1. ASTM A123 Standard Specification for Zinc (Hot-Dip Galvanized) Coatings on Iron and Steel Products
2. ASTM A153 Standard Specification for Zinc Coating (Hot-Dip) on Iron and Steel Hardware
3. ASTM A307 Standard Specification for Carbon Steel Bolts and Studs
4. ASTM A569 Electric-Fusion (Arc) Welded Steel Pipe
5. Virginia Department of Transportation Road and Bridge Specifications

LOUDOUN WATER REQUIREMENTS

1. **A project specific materials submittal must be reviewed and approved by Loudoun Water.**
2. Design of tunnel liner shall be sealed by a Professional Engineer licensed in the Commonwealth of Virginia. Liner plate shall be hot-dipped galvanized, with bituminous coating and 2-inch grout holes every 3 rings minimum. Liner plate thickness shall be 8 gauge minimum.
3. Casing shall be smooth wall steel pipe, conforming to ASTM A 139 Grade B with a minimum wall thickness of ½ inch, or ASTM A53 Standard Weight Class. Hydrostatic testing is waived. Casing shall be exterior prime coated with bituminous asphalt coating and have beveled edges suitable for field welding. Smooth Wall steel pipe shall have weld beads of no more than ¼ inch tall and a minimum radius of curvature of 2 inch. Spiral welded pipe is not permitted.

MANUFACTURERS AND MODELS

Company Name	Approval Date	Model Name/Number
DSI Tunneling LLC	10/1999	Liner Plate
Contech Construction Products	10/1999	Liner Plate
Arcelormittal	10/1999	Liner Plate
Northwest Pipe Company		Permalok Bell and Spigot Casing
Pittsburgh Pipe/TDI	10/1999	Casing
Coastal Pipe, Inc.	9/2010	Casing

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Company Name	Approval Date	Model Name/Number
OPS Sales Company (Oilfield Pipeline Services)	8/2011	Casing
Arntzen Steel Pipe	11/2015	Casing
Victor Pipe & Steel, Inc.	11/2024	Casing
Victory Steel Products	11/2024	Casing

Casing Spacers

LOUDOUN WATER REQUIREMENTS

1. **A project specific materials submittal must be reviewed and approved by Loudoun Water. Dimensions of casing spacers must be coordinated with the inside diameter of the selected casing. Design will typically require that the carrier pipe be supported in the centered and restrained position.**
2. 8-inch width for 12-inch diameter pipe or smaller.
3. 12-inch width for 16-inch diameter or larger.
4. Minimum of three (3) casing insulators required per length of pipe.
5. Bolts and nuts shall be T304 stainless steel.

MANUFACTURERS AND MODELS

Company	Approval Date	Model Name/Number
Cascade Waterworks Manufacturing	10/1999	
Pipeline Seal & Insulator, Inc.	10/1999	
Power Seal	4/1998	Casing Chock Model 4810
The BWM Company	10/2002	BWM SS
RACI Spacers North America, Inc.	7/2006	
Advance Products & Systems, Inc.	7/2006	Model SSI
CCI	11/2015	Models CSS8 and CSS12

Vaults

STANDARDS

1. ACI 301 Specifications for Structural Concrete for Buildings
2. ACI 318 Building Code Requirements for Reinforced Concrete
3. ASTM A185 Welded Steel Wire Fabric for Concrete Reinforcement
4. ASTM A615 Deformed and Plain Billet Steel Bars for Concrete Reinforcement
5. ASTM C857 Standard Practice for Minimum Structural Design Loading for Underground Precast Concrete Utility Structures
6. ASTM C858 Standard Specification for Underground Precast Concrete Utility Structures
7. ASTM C890 Standard Practice for Minimum Structural Design Loading for Monolithic or Sectional Precast Concrete Water or Wastewater Structures

LOUDOUN WATER REQUIREMENTS

1. **A project specific materials submittal must be reviewed and approved by Loudoun Water.**
2. Design to be sealed by Professional Engineer licensed in the Commonwealth of Virginia. Design shall meet AASHTO H-20 loading criteria.
3. Concrete to be minimum 4,000 psi compressive strength at 28 days.
4. Joints to be interlocking type, waterproofed with butyl rubber. In addition, joint exteriors shall be waterproofed with one of the wraps listed below. Vertical joints prohibited, except where construction by panels has been specifically approved by Loudoun water.
5. Access door shall be 36 inches by 36 inches minimum with hinged frame and cover and shall meet AASHTO H-20 loading criteria.
6. Access door shall be aluminum with stainless steel hardware and shall contain an automatic hold open arm, slam lock with removable key, safety grate and have a drainable frame.
7. Ladder shall be heavy-duty aluminum, 16 inches wide with non-skid treads, securely fastened to wall with stainless steel bolts. Provide safety features in accordance with Loudoun Water Standard Details G-21 VAULT NOTES, G-22 VAULT LADDER, and G-23 HATCH SAFETY FEATURES.
8. All penetrations for pressure pipes shall incorporate Omni Sleeve by Sigma or Loudoun Water approved equal. For gravity sewer connections, use approved pipe to structure connector as listed in SEWER, Section3.

9. Pressure pipe shall be flanged, supported as necessary, with flange adapter(s), flange by mechanical joint coupling(s), and/or dismantling joint(s) to enable disassembly. See construction plans for placement and specific type of fitting.

VAULT MANUFACTURERS

Company	Approval Date
A. C. Miller Concrete Products	10/1999
Clear Flow by CP&P	10/1999
Oldcastle Infrastructure	10/1999
Smith-Midland	10/1999

HATCH MANUFACTURERS AND MODELS

Company	Approval Date	Model Name/Number
Bilco	10/1999	Series J Access Door – H20
Halliday Products	9/2018	Series H1R Access Door
USF Fabrications	9/2018	THD, THS
EJ	1/2022	CHS series

JOINT WRAPMANUFACTURERS AND MODELS

Company	Approval Date	Model Name/Number
Canusa	10/1999	Wrapid Seal joint wrap
Press-Seal Gasket Corporation	6/2008	E-Z Wrap joint wrap
Cretex	7/2003	Cretex Wrap Joint Wrap

Marking Tape

STANDARD

1. ASTM-D-2103
2. ASTM-D-882 Method A

LOUDOUN WATER REQUIREMENTS

1. Thickness, tensile strength, longitudinal elongation and transverse elongation must meet the above standards. Colors shall not deteriorate with long-term exposure to soil. Tape shall be 6 inches wide, polyethylene, 4 mils minimum thickness. Text must be at intervals of 36 inches or less.
2. Tape installed with water piping shall have APWA blue background with "CAUTION BURIED WATER LINE" in black letters.
3. Tape installed with reclaimed water piping shall have APWA purple background with caution statement "CAUTION: RECLAIMED WATER—DO NOT DRINK" in black letters.
4. Tape installed with sanitary sewer shall have APWA green background with "CAUTION BURIED SEWER LINE" in black letters.
5. Tape installed with cathodic protection systems shall have APWA red or yellow background with "CAUTION CATHODIC PROTECTION CABLE BURIED BELOW" in black letters.

MANUFACTURERS AND MODELS

Company	Approval Date	Model Name/Number
Brady	10/1999	Identoline
Empire	10/1999	ShieldTec
Marking Services Incorporated	6/2004	
Pro-Line Safety Products/Presco	4/2009	
Allen Systems	11/2005	Detectatape
Lineguard, Inc.	11/2005	Lineguard Super Tuff III
Harris Industries	1/2010	
Mutual Industries	2/2012	
Christy's	2/2012	
Presco	11/2015	

Tracer Wire

LOUDOUN WATER REQUIREMENTS

1. Tracer wire required only with nonmetallic (e.g. PVC, HDPE or PEX) pipeline.

2. Wire to be #12 AWG solid copper with low density polyethylene insulation of minimum thickness 45 mils.

3. Along mains, use Rhino TriView™ tracer pedestals to terminate wire. Pedestals shall be at maximum 1000' intervals along the pipeline. Wire must not be spliced between pedestals.

4. For gravity sewers, wire is not required with mainline of manhole to manhole construction.

5. Tracer wire is required with sanitary laterals, from main to structure served. Terminate tracer wire on sanitary lateral at building's exterior, per Loudoun Water standard cleanout detail. If iron frame and cover is not to be used on cleanout, Loudoun Water recommends terminating tracer wire with green Soilmarker™ by Rhino Marking and Protection Systems, or Tracer Wire Access Box by Drainage and Water Solutions, Inc.

6. Where possible, tracer wire is to terminate outside pavement and gravel areas where an above ground pedestal can be used. Where tracer wire must terminate within pavement or gravel areas and an above ground pedestal can't be used, the tracer wire is to terminate in an at grade box with the lid labeled 'Tracer Wire'.

MANUFACTURERS AND MODELS

Company	Approval Date	Model Name/Number
Kris-Tech Wire Company	10/1999	
Paige Electric Company	10/1999	
Pro-Line Safety Products	4/2009	
Bingham and Taylor (Tracer Wire Access Box)	2/2025	P2B202CNGLGE (Concrete) P2B202CNGHVY (Asphalt)
PRO-MARK (Tracer Wire Access Box)	10/25	PM-TS5

Marker Posts and Tracer Pedestals

LOUDOUN WATER REQUIREMENTS

UTILITY	TYPE OF PIPE	POST	DECALS (3 PER POST)
WATER	IRON	78" BLUE MARKER	SD-7443K
	NON-METALIC	54" BLUE TRACER PEDESTAL AND 78" BLUE MARKER	SD-7443K
RECLAIMED WATER	IRON	78" PURPLE MARKER	SD-7617K
	NON-METALIC	54" PURPLE TRACER PEDESTAL AND 78" PURPLE MARKER	SD-7617K
GRAVITY SEWER	ALL TYPES	78" GREEN MARKER	SD-7442K
PRESSURIZED SEWER	IRON	78" GREEN MARKER	SD-7441K
	NON-METALIC	54" GREEN TRACER PEDESTAL AND 78" GREEN MARKER	SD-7441K

MANUFACTURERS AND MODELS

Company	Approval Date	Model Name/Numbers
Rhino Markings and Protection Systems	10/2006	see table above
PRO-MARK	10/2025	PM-303 (color per table above)

Lock for Entry Doors to Above Grade Structures

LOUDOUN WATER REQUIREMENTS

1. Lock to be type listed for authorized duplication only. During construction, lock may be keyed for contractor's key, and for Loudoun Water's "landlord" key.

MANUFACTURERS AND MODELS

Company	Approval Date	Model Name/Number
Schlage	10/2012	
Weiser	10/2012	
Baldwin	10/2012	

CATHODIC PROTECTION

Magnesium Anodes

STANDARDS

1. ASTM B 843

LOUDOUN WATER REQUIREMENTS

1. Each anode shall have the following nominal weights and dimensions:

Anode Nominal Weight (lbs.)*	Dimensions (inches)
17	25 long and D-shaped (2.5 inches by 3.5 inches by 3.5 inches)
20	58.75 long and D-shaped (2.5 inches by 2.5 inches by 2.375 inches)
32	21 long and D-shaped (5 inches by 6 inches by 4.5 inches)

* excluding backfill

2. Composition of anodes shall be as follows:
   - Aluminum 0.010% Maximum
   - Manganese 0.50 to 1.3%
   - Copper 0.02% Maximum
   - Nickel 0.001% Maximum
   - Zinc 0.05% Maximum
   - Iron 0.03% Maximum
   - Silicon 0.05% Maximum
   - Other 0.05% Each or 0.030% Maximum Total
   - Magnesium Remainder
3. Each anode and backfill shall be vibratory packaged in a permeable cardboard box or cloth bag with the following dimensions:

Anode Nominal Weight (lbs.)	Boxed Dimensions (inches)	Cloth Bag -Packaged Dimensions (inches)	Backfill Weight (lbs.)
17	minimum 32 long by 5.5 on each side	minimum of 29 long by 6.5 on each side	28
20	minimum 71 long by 4.5 on each side	minimum of 56 long by 5.0 on each side	45
32	minimum 24 long by 7.5 on each side	minimum of 28 long by 8.0 on each side	38

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4. Anode backfill shall have the following composition:
    - Hydrated Gypsum 75%
    - Bentonite 20%
    - Sodium Sulfate 5%
5. A minimum of 10 feet of AWG # 12 stranded copper wire with TW insulation (black) shall be attached to the anode. Wire anode attachment shall be by silver solder and sealed to prevent a moisture penetration.

MANUFACTURERS AND MODELS

Company	Approval Date	Model Name/Number
Stuart Steel Protection Company	11/2005	Viboxed Maxmag
Magspecialties	11/2005	Galvomag
3N International, Inc.	1/2010	High Potential
Corrpro Companies, Inc.	4/2012	High Potential Cast Magnesium
Piping & Corrosion Specialties	9/2025	High Potential Prepackaged Cast Magnesium

Current Measuring Shunt

LOUDOUN WATER REQUIREMENTS

1. Test station shunts shall be manufactured with a mounting board to fit the terminal posts for the specified test station.
2. The resistance shall be 0.01 OHM with a current capacity of 8 amperes.

MANUFACTURES AND MODELS

Company	Approval Date	Model Name/Number
COTT Manufacturing Company	11/2005	Yellow
Pro-Mark Utility Supply, Inc.	1/2010	Yellow

Test Station

LOUDOUN WATER REQUIREMENTS

1. Flush mount test stations shall consist of a nonconductive terminal board mounted in a locking cover, suitable for placement in heavy traffic areas. Covers shall be lettered as indicated in Figure CP-11 TEST STATION BY BOX AT GRADE of the Standard Details.

2. The test station shall consist of a cast iron lid with a cast iron collar. The body of the test station shall be 5 inches inner diameter with a length of 18 inches.

3. The mounting board shall be nonconductive material and shall have a minimum of seven terminal posts.

4. Test station terminal lugs shall be one-hole, compression terminal lugs for 0.25 inch bolt size

MANUFACTURERS AND MODELS

Company	Approval Date	Model Name/Number	Conditions of Approval
Rhino Marking and Protection Systems	4/2013	54" TriView Test Station	
Bingham & Taylor	1/2010	NM-5	
Thomas and Betts Corporation (ABB)	11/2005	Series 54100 and Model c-10-14; one hole, compression terminal legs for 0.25 inch bolt size.	Terminal lugs only
PRO-MARK	10/2025	PM-TS3 PM-TS5 (Flush mount)	

Permanent Reference Electrode

LOUDOUN WATER REQUIREMENTS

1. Insulating Unions: Approved insulating unions shall be installed in accordance with specific design considerations to isolate bimetallic service lines and other type connections that may create corrosion conditions from dissimilar metallic connections.

MANUFACTURERS AND MODELS

Company	Approval Date	Model Name/Number
Borin Manufacturing, Inc.	6/2016	Stelth®2 Cu-CuSO4 Reference Electrode

Cathodic Protection Coupons

MANUFACTURERS AND MODELS

Company	Approval Date	Model Name/Number
M.C. Miller Co.	3/2024	Ductile Iron Cylindrical Coupon with Twin THHN Wires (COU200 family)

Wire

STANDARDS

1. ASTM B-8
2. ASTM D-1248, Type 1, Class A, Category 4 & 5, Grade E-5

LOUDOUN WATER REQUIREMENTS

1. All wiring, excluding wire provided with the anodes, shall be copper wire of the specified AWG wire size and color, as shown in the Standard Details.
2. Wire for the bonding of joints shall be #4 AWG stranded copper with high molecular weight polyethylene (HMWPE) insulation conforming to ASTM D-1248 as listed above. For pipes larger than 36" in diameter, #2 AWG is required.

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3. Anode header cable to be #8 AWG with HMWPE insulation conforming to ASTM D-1248 as listed above.

4. Wire for test stations leads shall be #8 or #10 AWG stranded copper wire, 600-volt, with THWN insulation, in colors as specified by construction plans and the Standard Details.

MANUFACTURERS AND MODELS

Company	Approval Date	Model Name/Number
Performance Wire & Cable Inc.	10/2025	HMWPE Cathodic Protection Cable

Splicing Tape

LOUDOUN WATER REQUIREMENTS

1. Electric tape shall be applied over splicing compound for underground splicing of anode cables and test wire connections.

MANUFACTURERS AND MODELS

Company	Approval Date	Model Name/Number
3M Company	11/2005	Scotch® Linerless Rubber Splicing Tape 130C
	11/2005	Scotch® Vinyl Electrical Tape Super 88
	1/2010	33+Vinyl Electrical Tape

Splice Coating Compound

LOUDOUN WATER REQUIREMENTS

1. Electric coating compound shall be applied for underground splicing of anode cables and test wire connections.

MANUFACTURERS AND MODELS

Company	Approval Date	Model Name/Number
3M Company	11/2005	Scotchkote™ Electrical Coating FD

Thermite Weld Equipment

LOUDOUN WATER REQUIREMENTS

1. Thermite weld molds and charges shall be suitable for the sizes and types of materials and shapes encountered.

2. Adapter sleeves shall be utilized for all thermite welds.

MANUFACTURERS AND MODELS

Company	Approval Date	Model Name/Number
Erico, Inc	11/2005	Cadweld
Continental Industries (Hubbell Corp.)	11/2005	thermOweld®

Coating for Thermite Welds

LOUDOUN WATER REQUIREMENTS

1. Thermite welds are to be coated with prefabricated one piece elastometric filled, plastic cap (Royston handy-cap or approved equal).

2. The appropriate primer as required by the elastometric cap manufacturer shall be used.

MANUFACTURERS AND MODELS

Company	Approval Date	Model Name/Number
Royston	11/2005	Roybond 747 primer with Royston Handy Cap
Continental Industries (Hubbell Corp.)	1/2010	ThermOcap PC - Primerless
		ThermOcaps with Polyken 1027 Primer
Amcorr Products & Services	6/2016	VISCOTAQ® Coating Patch

Insulating Flange

LOUDOUN WATER REQUIREMENTS

1. The following dielectric materials shall be used for the fabrication of the flange insulator.
    - **Insulating Gasket:** Insulating gasket retainers shall be full-face, Type E, NEMA G 10 glass, reinforced epoxy retainers with an ethylene propylene diene monomer (EPDM) rubber rectangular cross section O-ring seal. Minimum total gasket thickness shall be at least 1/8 inch. The gasket shall have the same outside diameter as the pipe flange. At valve-to-pipe connections where the inside diameters are not equal, the gasket's inside diameter shall be equal to the smaller of the two inside diameters. Dielectric strength shall be at least 550 volts per mil in accordance with ASTM D149, and compressive strength shall be not less than 50,000 psi. The manufacturer's name and date of manufacture shall be marked on both sides of the gasket with a minimum of 2 inch tall block letters using a durable marking ink or paint. The gasket shall be installed within six months of its manufacture date. Do not store insulated flange gaskets under direct sunlight nor at temperatures exceeding 110 degrees Fahrenheit. Use PSI Linebacker insulating gasket or approved equal.
    - **Insulating Sleeves:** Provide full-length, one-piece, NEMA G-10 glass-reinforced epoxy insulating flange bolt sleeves. Dielectric strength shall be at least 400 volts per mil, in accordance with ASTM D257. The length of the insulating sleeves shall provide an air gap between the end of the insulating sleeve and the inside surface of the stud bolt nut with a tolerance of 1/32 inch minimum and 1/8 inch maximum. Insulating sleeve length must be adjusted for the actual thickness of the steel washers and insulating washers, in accordance with ASTM F436. The bolt holes on the opposing flanges shall be aligned so as not to pinch the insulating sleeve, which would result in electrical shorting of the two flanges.
    - **Insulating Washers:** Insulating washers shall be NEMA G-10 glass-reinforced epoxy with a minimum thickness of 1/8 inch. Dielectric strength shall not be less than 550 volts per mil, and compressive strength shall not be less than 50,000 psi. The insulating washer's inside diameter shall be sized to fit over the insulating sleeve's outside diameter.
    - **Steel Washers:** Provide hardened steel washers that conform to ASTM F436 for insulated flanges greater than 36 inches in nominal diameter. Double steel washers—four steel washers per flange bolt—are required for insulated flanges greater than 36 inches in nominal diameter. The inside and outside diameters of the steel washers shall match those of the insulating washers. The steel washers must be able to freely rotate around the insulating sleeve. Attention must be paid to the fit between the steel washers and the insulating sleeve in order to avoid the washers twisting and cracking the sleeves when the flange bolts are torqued.
    - **Insulating Unions:** Approved insulating unions shall be installed in accordance with specific design considerations to isolate bimetallic service lines and other type connections that may create corrosion conditions from dissimilar metallic connections.

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MANUFACTURERS AND MODELS

Company	Approval Date	Model Name/Number
PSI Industries, Inc.	11/2005	
Advance Products & Systems, Inc.	11/2005	

Coating for Mechanical Joints and Insulating Flanges

STANDARDS

1. AWWA C217
2. AWWA C209

LOUDOUN WATER REQUIREMENTS

1. All mechanical joints shall be field coated with a petrolatum system (wax and tape), in accordance with manufacturer's recommended installation procedures. The mechanical joints shall be fully coated. The remainder of the fitting need not be wrapped in the wax and tape.
2. Insulating flanges shall be field coated with a petrolatum system (wax and tape) in accordance with manufacturer's recommended installation procedures.

MANUFACTURERS AND MODELS

Company	Approval Date	Model Name/Number
Raychem Inc.	11/2005	wax and tape system
Denso North America Inc.	11/2005	wax and tape system
Trenton Wax Tape	11/2005	#1 Wax-Tape Coating System
Superior Corrosion Control (SCC)	3/2019	wax and tape system: prime guard brown primer, CorrGuard B, SCC Poly Wrap

Bonded Coating for Ductile Iron Pipe and Fittings

LOUDOUN WATER REQUIREMENTS

1. Where pipe with a bonded coating is being installed, fittings shall be wrapped in a tape coating with polyethylene backing.

MANUFACTURERS AND MODELS

Company	Approval Date	Model Name/Number	Conditions of Approval
Liberty Coating Company, LLC	10/2016	PRITEC®	for use on ductile iron pipe
Berry Global	10/2016	Polyken #930 polyethylene backed tape wrap with Polyken #939 filler mastic and #1027 liquid adhesive	for use on iron fittings and pipe joints
Canusa-CPS	4/2017	Aqua-Shield™ AQW	for use on pipe joints

Polyethylene Encasement

STANDARDS

1. ANSI/AWWA C105/A21.5

LOUDOUN WATER REQUIREMENTS

1. Polyethylene encasement shall comply with ANSI/AWWA C105/A21.5. Material may be 4 mil thick cross-laminated high density polyethylene, or 8 mil linear low density polyethylene. Seamless flat tube form must comply with the minimum widths based on nominal pipe diameter in accordance with above standard.

2. Where polyethylene encasement of pipe is specified, fittings and valve bodies are to be included within the encasement.

3. In reclaimed water installations, polyethylene wrap must be purple and printed with the statement "CAUTION: RECLAIMED WATER—DO NOT DRINK" in text size and spacing cited in the Virginia Water Reclamation and Reuse Regulation.

MANUFACTURERS AND MODELS

Company	Approval Date	Model Name/Number
Sigma	6/2009	
Trumbull Mfg.	2/2012	
Flexsol	2/2012	
Enhanced Polyethylene Encasement		
DIPRA*	5/2024	V-BIO
AA Thread	10/2025	VB3®

*DIPRA authorized manufacturer

Miscellaneous Products

Insulating Unions:	Mueller Company
Field Applied Dielectric:	Royston Company; R28 Rubberized Mastic Carboline; Bitumastic No. 50
Steel Hand Stamp:	C.H Hanson Company; Model Nos. 24450/22981 with 3/8 inch letter
Solder:	0.062 inch diameter 60/40 Solder with 3.5 percent type RMA rosin core
Glass Mesh:	various thicknesses based on electrical isolation requirements
Separator Mesh:	Tuff-N-Nuff Industries, Inc.; Tuff-N-Nuff Rock Shield

WATER, SECTION 1 – PIPE

Ductile Iron Pipe

STANDARDS

1. ANSI/AWWA C151/A21.51 Ductile-Iron Pipe, Centrifugally Cast
2. ANSI/AWWA C104/A21.4 Cement-Mortar Lining for Ductile Iron Pipe and Fittings

LOUDOUN WATER REQUIREMENTS

1. In addition to conforming to all applicable sections of the above standards, pipe shall:
   - be Thickness Class 52 or higher.
   - have cement lining with seal coat, in accordance with ANSI/AWWA C104/A21.4.
2. Acceptable diameters are 4, 6, 8, 10, 12, 16, 20, 24, 30, 36, 42, 48 and 54 inches.

MANUFACTURERS AND MODELS

Company	Approval Date
American Ductile Iron Pipe	10/1999
Atlantic States/Clow/McWane	10/1999
U. S. Pipe	10/1999

Push-On Joints

STANDARD

1. ANSI/AWWA C111/A21.11 Rubber-Gasket Joints for Ductile-Iron Pressure Pipe and Fittings

LOUDOUN WATER REQUIREMENTS

1. Pipe joints shall conform to the above referenced standard, and shall be push-on type, unless otherwise specified on construction plans.

MANUFACTURERS AND MODELS

Company	Approval Date	Model Name/Number
American Ductile Iron Pipe	10/1999	Fastite®
Atlantic States/Clow/McWane	10/1999	Tyton®(4”-24”) Fastite®(30”-36”)
U. S. Pipe	10/1999	Tyton®

Mechanical Joints

STANDARD

1. ANSI/AWWA C111/A21.11 Rubber-Gasket Joints for Ductile-Iron Pressure Pipe and Fittings

LOUDOUN WATER REQUIREMENTS

1. Mechanical joints, including nuts and bolts, shall conform to the above referenced standard.
2. **Mechanical joint pipe shall be used only where specified on approved construction plans or detail (typically at blow-off and in dead end hydrant assembly).**

MANUFACTURERS AND MODELS

Company	Approval Date	Size
American Ductile Iron Pipe	10/1999	
Atlantic States/Clow/McWane	10/1999	
U. S. Pipe	10/1999	4”-16”

Flanged Joints

STANDARD

1. ANSI/AWWA C115/A21.15 Flanged Ductile-Iron Pipe with Ductile Iron or Gray-Iron Threaded Flanges

LOUDOUN WATER REQUIREMENTS

1. Flanged joints shall conform to the above referenced standard.
2. **Flanged joints may be used only in buildings, in vaults, or where specified on construction plans.**
3. Bolt circle and holes shall conform to Class 125 standard template in accordance with ANSI B16.1.
4. Gaskets 12-inches in diameter and smaller shall be full-faced 1/8-inch thick, and shall conform to the dimensions of Table A1 of AWWA C115 Section A2. For pipe sizes 16-inch and larger, use ring gasket.
5. Gaskets shall extend to inside of bolt holes, and to the inside diameter of the pipe, thereby protecting the threads that join the flange from corrosion.
6. Drop-in type gaskets may be used only upon specific approval.
7. Bolts and nuts shall be low-carbon steel, ASTM A307 Standard Specification for Carbon Steel Bolts and Studs, 60,000 psi tensile strength, Grade B.

MANUFACTURERS AND MODELS

Company	Approval Date
American Ductile Iron Pipe	10/1999
Atlantic States/Clow/McWane	10/1999
U. S. Pipe Fabrication, LLC (Forterra)	10/1999
Higgins Engineering	2/2012

Restrained Joint Piping Systems

STANDARD

1. ANSI/AWWA C111/A21.11 Rubber-Gasket Joints for Ductile-Iron Pressure Pipe and Fittings

LOUDOUN WATER REQUIREMENTS

1. Restrained joints shall conform to the above referenced standard.
2. Restrained joint piping systems shall be used where specified on construction plans.
3. Restrained joint piping systems are required for installations through casings or tunnels, in conformance with Standard Detail G-12 CASING INSTALLATION.
4. **A project specific materials submittal must be reviewed and approved by Loudoun Water.** Loudoun Water reserves the right to select from the list of joints below, based upon the characteristics of the specific application.
5. Field welding of restraining components is not permitted.

MANUFACTURERS AND MODELS

Company	Approval Date	Model Name
American Ductile Iron Pipe	10/1999	Flex-Ring®
Atlantic States/Clow/McWane	9/2010	TR Flex®
U. S. Pipe	9/2024 10/1999	HDSS® HP Lok® Mech-lok™ Bolt-lok™

Locking Gaskets

STANDARD

1. ANSI/AWWA C111/A21.11 Rubber-Gasket Joints for Ductile-Iron Pressure Pipe and Fittings

LOUDOUN WATER REQUIREMENTS

1. Locking gaskets shall conform to the above referenced standard.
2. **Locking gaskets may be used in conformance with the Standard Details listed below. Use in other applications is prohibited, except where application specific approval is granted by Loudoun Water.**

   G-11 RESTRAINT OF VERTICAL OFFSET

   W-10 FIRE HYDRANT ALONG STREET / W-11 FIRE HYDRANT BEHIND DITCH / W-12 DEAD END HYDRANT

   W-20 FIRE SERVICE CONNECTION

   W-28 2" OMNI C2, OMNI T2, OR MAGNETIC METER

   W-29 3", 4" AND 6" OMNI C2, OMNI T2 OR MAGNETICMETER IN VAULT

   W-31 SERVICE ENTRANCE WITH INDOOR METER

   R-3 TERMINUS BY FLUSHING HYDRANT / R-5 REUSE FLUSHING HYDRANT BELOW GRADE / R-6 REUSE FLUSHING HYDRANT ABOVE GRADE

   R-12 2" MAGNETIC REUSE METER

   R-13 3", 4" OR 6" MAGNETIC REUSE METER IN VAULT

   R-14 REUSE SERVICE ENTRANCE WITH INDOOR METER

MANUFACTURERS AND MODELS

Company	Model	Conditions of Approval
U. S. Pipe	FieldLok 350® Gasket	Must be used with Tyton® joint pipe, conforming to latest joint design issued by U. S. Pipe.
American Ductile Iron Pipe	Fast-Grip Gasket	Must be used in a Fastite® joint.

Threaded Nipples

LOUDOUN WATER REQUIREMENTS

1. Made of ductile iron conforming to ASTM A-536, Grade 65-45-12.
2. Minimum wall thickness equal to 0.25" and outside diameters equal to IPS pipe sizes.
3. Threads per ANSI B.120-1-1983.
4. Fusion bonded epoxy coating and lining required.

MANUFACTURERS AND MODELS

Company	Approval Date	Model Name/Number
Harrington Corporation (HARCO) / Specified Fittings	6/2002	

Plastic Pipe

STANDARDS

1. ANSI/AWWA C900-16 Polyvinyl Chloride (PVC) Pressure Pipe and Fabricated Fittings, 4 In. through 12 In. (100 mm Through 1,500 mm), For Water Distribution

LOUDOUN WATER REQUIREMENTS

1. Plastic pipe will be specified only for special applications, typically for limited segments where nearby utility may result in stray electrical current.

2. Pipe shall conform to one of the above standards.

3. See construction plans for required dimension ratio (DR). Typically DR14 will be specified.

MANUFACTURERS AND MODELS

Company	Approval Date	Model Name/Number
Diamond Plastics Corporation	10/1999	
IPEX, Inc.	10/1999	
National Pipe & Plastics, Inc.	10/1999	
Rehau	10/1999	AQUALOC
NAPCO/Westlake	10/1999	
NAPCO/Westlake	10/1999	PVC C900-16
		Certa-Lok™ C900RJ/RJIB
Sanderson Pipe Corp.	3/2024	

WATER, SECTION 2 – CAST AND DUCTILE FITTINGS

Compact Ductile Iron Mechanical Joint Fittings

STANDARDS

1. ANSI/AWWA C153/A21.53 Ductile-Iron Compact Fittings
2. ANSI/AWWA C104/A21.4 Cement-Mortar Lining for Ductile-Iron Pipe and Gray-Iron Fittings
3. ANSI/AWWA C116/A21.16 Protective Fusion-Bonded Epoxy Coatings for Interior and Exterior Surfaces of Ductile-Iron and Gray-Iron Fittings

LOUDOUN WATER REQUIREMENTS

1. Fittings shall conform to ANSA/AWWA C153/A21.53, and have lining and coating in accordance with either the second or third standard listed above.
2. Minimum Pressure Class 350 in diameters 3”-24”, and Class 250 in diameters 30”-48”.
3. Bolts and nuts shall be in accordance with AWWA C111.
4. Fitting design shall prevent T-head bolts from rotating.
5. **All sleeves shall be long pattern unless otherwise approved by Loudoun Water.**

MANUFACTURERS AND MODELS

Company	Approval Date	Conditions of Approval
American Cast Iron Pipe Co.	10/1999	
SIP Industries	7/2014	
Sigma	6/1995 2/2001	
Star Pipe Products, Inc.	6/1996	
Tyler Union Foundry (McWane)	10/1999	
U. S. Pipe	10/1999 6/2001	mortar lined or Permafuse® epoxy

Flanged Fittings

STANDARDS

1. ANSI/AWWA C110/A21.10 Ductile-Iron and Gray-Iron Fittings
2. ANSI/AWWA C104/A21.4 Cement-Mortar Lining for Ductile Iron Pipe and Fittings
3. ANSI/AWWA C116/A21.16 Protective Fusion-Bonded Epoxy Coatings for Interior and Exterior Surfaces of Ductile-Iron and Gray-Iron Fittings

LOUDOUN WATER REQUIREMENTS

1. Fittings shall conform to ANSA/AWWA C110/A21.10, and have lining and coating in accordance with either the second or third standard listed above.
2. Flange dimensions shall conform with ASME B16.1 class 125.
3. Minimum pressure rating of 250 psi (all sizes).
4. Bolts and nuts shall be low-carbon steel, ASTM A307, Standard Specification for Carbon Steel Bolts and Studs, 60,000 psi tensile strength, Grade B.

MANUFACTURERS AND MODELS

Company	Approval Date	Conditions of Approval
American Cast Iron Pipe Co.	10/1999	
SIP Industries	7/2014	
Sigma	6/1995 2/2001	
Star Pipe Products, Inc.	6/1996	
Tyler Union Foundry (McWane)	10/1999	
U. S. Pipe	10/1999 6/2001	mortar lined or Permafuse® epoxy

Tangent (Offset) Tee

STANDARDS

1. ANSI/AWWA C110/A21.10 Ductile-Iron and Gray-Iron Fittings
2. ANSI/AWWA C153/A21.53 Ductile-Iron Compact Fittings
3. ANSI/AWWA C104/A21.4 Cement-Mortar Lining for Ductile Iron Pipe and Fittings

LOUDOUN WATER REQUIREMENTS

1. Tangent tees shall conform to either standard 1 or 2 listed above, and shall have cement mortar lining. Ends are to be mechanical joint.
2. Tangent tees are required on mains of diameter 16" and larger, where specified on construction plans.

MANUFACTURERS AND MODELS

Company	Approval Date
Star Pipe Products	2/2007
SIP Industries	7/2014
Horizon Metals, Inc.	4/2017

PLEASE NOTE: TANGENT TEES MUST BE ORDERED WELL IN ADVANCE OF THE INSTALLATION TO ENSURE ADEQUATE LEAD TIME FOR DELIVERY.

Anchoring (Swivel) Fittings

STANDARDS

1. ANSI/AWWA C110/A21.10 Ductile-Iron and Gray-Iron Fittings
2. ANSI/AWWA C104/A21.4 Cement-Mortar Lining for Ductile-Iron Pipe and Fittings
3. ANSI/AWWA C116/A21.16 Protective Fusion-Bonded Epoxy Coatings for Interior and Exterior Surfaces of Ductile-Iron and Gray-Iron Fittings

LOUDOUN WATER REQUIREMENTS

1. Cement mortar lining required, except where lined with fusion bonded epoxy per AWWA C116.
2. Ends shall be mechanical joint.

MANUFACTURERS AND MODELS

Company	Approval Date	Model Name/Number
Assured Flow Sales, Inc.	4/1997	GradeLok
American Cast Iron Pipe Co.	10/1999	anchoring tees and anchoring couplings
SIP Industries	7/2014	anchoring tees and anchoring couplings
Tyler Pipe/ Union Foundry	10/1999	anchoring tees and anchoring couplings
Star Pipe Products	6/1996	anchoring tees and anchoring couplings
Sigma	10/1999	anchoring tees and anchoring couplings
U. S. Pipe & Foundry Co.	10/1999	anchoring tees and anchoring couplings
Infact Corporation	6/2008	Foster Adaptor with epoxy coating and stainless steel accessory pack, in sizes 10" and larger. **Not to be substituted for an anchoring coupling**.

Compact Gland (M.J. Accessory Kit)

STANDARD

1. ANSI/AWWA C111/A21.11 Rubber-Gasket Joints for Ductile-Iron Pressure Pipe and Fittings

LOUDOUN WATER REQUIREMENTS

1. Glands of all sizes must be of ductile iron.
2. Bolts and nuts shall be in accordance with AWWA C111.

MANUFACTURERS AND MODELS

Company	Approval Date	Model Name/Number
American Cast Iron Pipe Co.	10/1999	
SIP Industries	7/2014	
Sigma	6/1995	
Star Pipe Products	6/1996	
Tyler Union Foundry (McWane)	10/1999	
U. S. Pipe & Foundry Co.	10/1999	

Restraining Gland

STANDARDS

1. ANSI/AWWA C111/A21.11 Ductile-Iron and Gray-Iron Fittings, 3 In. through 48 In. (76 mm through 1,219 mm) for Water

LOUDOUN WATER REQUIREMENTS

1. Pressure rating of 350 psi for sizes 4" through 16". Pressure rating of 250 psi for sizes 20" through 48".

2. Bolts and nuts shall be in accordance with ANSI/AWWA C111/A21.11.

3. Where casting a line anchor, or otherwise installing around an existing pipe without connecting MJ bell, use gland designed for mid-span installation.

MANUFACTURERS AND MODELS

Company	Approval Date	Model Name/Number	Conditions of Approval
EBAA, Inc.	10/1999	1100 MEGALUG®	for use on DIP
	9/2016	2000 PV MEGALUG®	for use on PVC
	5/2018	1100SDB Series	Mid-span restraint
Star Pipe Products	12/2008	Stargrip® Series 3000	for use on DIP
	9/2016	PVC Stargrip® Series 4000	for use on PVC
Sigma	6/2009	ONE-LOK™ SLDE	for use on DIP
	9/2016	ONE-LOK™ SLCE	for use on PVC
SIP Industries	7/2014	EZ Grip™ Series EZD	for use on DIP
	9/2016	EZ Grip™ Series EZP	for use on PVC
Ford Meter Box Company	8/2000	Uni-Flange, Series 1400	for use on DIP
	5/2018	Uni-Flange, Series 1495	Mid-span restraint

Flange by Mechanical Joint Coupling

STANDARD

1. ANSI/AWWA C115/A 21.11
2. ANSI/AWWA C111/A 21.11

LOUDOUN WATER REQUIREMENTS

1. Coupling, bolts and gaskets shall conform to the above standards.
2. Body shall be ductile iron per ASTM A536 Grade 65-45-12.
3. Couplings listed below are for use in buildings and vaults to enable components such as meters or valves to be removed from the line for maintenance. Use only where approved to enable the system to be dismantled. **Flanged couplings may not be substituted for fabricated sections of flanged pipe.**

MANUFACTURERS AND MODELS

Company	Approval Date	Model Name/Number
Star Pipe Products	12/2008	Starflange Series 3200
Smith-Blair	12/2012	911 Flange Lock
Romac	10/2013	RFCA Series

Flange Adapter

STANDARD

1. ANSI/AWWA C115/A 21.11

LOUDOUN WATER REQUIREMENTS

1. Flange adapters, bolts and gaskets shall conform to the above standards.
2. Body shall be ductile iron per ASTM A536 Grade 65-45-12.
3. Adapters listed below are for use in buildings and vaults to enable components such as meters or valves to be removed from the line. Use only where approved to enable the system to be dismantled. **Flange adapters may not be substituted for fabricated sections of flanged pipe.**

MANUFACTURERS AND MODELS

Company	Approval Date	Model Name/Number
EBAA, Inc	10/2016	2100 Megaflange®

Dismantling Joint (Flange x Flange)

STANDARD

1. ANSI/AWWA C115/A 21.11

LOUDOUN WATER REQUIREMENTS

1. Dismantling joint, bolts and gaskets shall conform to the above standards.
2. Body shall be ductile iron per ASTM A536 Grade 65-45-12.
3. Dismantling joints listed below are for use in buildings and vaults to enable components such as meters or valves to be removed from the line for maintenance. Use only where approved to enable the system to be dismantled.

MANUFACTURERS AND MODELS

Company	Approval Date	Model Name/Number
Smith-Blair	10/2016	SB 971 Series

WATER, SECTION 3 – VALVES AND HYDRANTS

Resilient Wedge Gate Valve

STANDARDS

1. ANSI/AWWA C509 Resilient-Seated Gate Valves for Water Supply Service
2. ANSI/AWWA C515 Reduced-Wall, Resilient-Seated Gate Valves for Water Supply Service
3. ANSI/AWWA C550 Protective Epoxy Interior Coatings for Valves and Hydrants
4. ASTM D 6284 Standard Test Method for Rubber Property-Effects of Aqueous Solutions with Available Chlorine and Chloramines

LOUDOUN WATER REQUIREMENTS

1. Gate valves shall conform to either standard 1 or 2 above. All gate valves shall be lined and coated per standard 3 above.
2. In buried applications, maximum size of 12", except where construction plans specify a larger gate valve. Butterfly valves are typically employed in buried applications 16" and larger.
3. Unless otherwise specified on construction plans, ends shall be mechanical joint for buried applications. Flanged ends shall be used in buildings, in vaults, and where joining to a tapping sleeve. Threaded ends used for 2" valve of blow-off assembly.
4. Fasteners exposed to backfill (not including those of the mechanical joint ends) must be T304 Stainless Steel.
5. Synthetic rubber compound must be resilient to continuous exposure to concentrations of chlorine and chloramines found in drinking water. Manufacturer of valve must evaluate rubber per Standard 4 above, and provide test results to Loudoun Water upon request.
6. Non-rising stem and O-ring seals.
7. Counter-clockwise rotation of operator to open. Operator to be 2-inch square nut for underground installations; with hand wheel in all buildings and vaults.

Continued on Next Page

MANUFACTURERS AND MODELS

Company	Approval Date	Model Name/Number	Conditions of Approval
American Flow Control	7/2000	Series 2500	
Clow/Kennedy/M & H (McWane)	10/1999		EPDM rubber required
Mueller Company	3/1999 Updated 10/24/2017	A-2361 Series A-2362 Series	
U. S. Pipe (by Mueller)	2008	A-USPO	
J&S Valve	6/2011		Limited Approval for Use May be included in specifications throughout all service areas, where in plant, station and vault applications.

Butterfly Valve

STANDARD

1. ANSI/AWWA C504 Rubber-Seated Butterfly Valves

LOUDOUN WATER REQUIREMENTS

1. Butterfly valves and actuators shall conform to the above standard.
2. Minimum size of 16", unless otherwise specified on construction plans.
3. Epoxy coated, inside and outside.
4. Fasteners exposed to backfill (not including those of the mechanical joint ends) must be T304 Stainless Steel.
5. Synthetic rubber compound must be resilient to continuous exposure to concentrations of chlorine and chloramines found in drinking water. EPDM to be used unless otherwise recommended by the manufacturer.
6. Unless otherwise specified, valves with flanged ends shall be short-body, Class 250B, per ANSI/AWWA C504.
7. Valves for bury below grade shall have mechanical joint ends and ladshall be Class 250B per ANSI/AWWA C504.
8. Actuators shall rotate counter-clockwise to open.
9. If PVC piping is specified on projects with butterfly valves, a 2-foot length of DIP or length of DIP to get to a fitting if fitting is closer than 6-feet, shall be used on each side of a butterfly valve prior to transitioning to PVC. Loudoun Water will have final determination on length of DIP. Cathodic protection of the DIP, fittings and valve are to be specified when necessary on a project-by-project basis.

MANUFACTURERS AND MODELS

Company	Approval Date	Model Name/Number
Clow/Kennedy/M & H	10/1999 Updated: 8/2019	3"-24": Model 4500 24"+: Model 1450
Mueller Company	10/1999	Lineseal XPII
Pratt (Mueller)	10/1999	HP250II
Val-Matic	4/2010	Series 2000
DeZurik	4/2010	BAW

Insert Valve

STANDARD

1. ANSI/AWWA C509 Resilient-Seated Gate Valves for Water Supply Service
2. ANSI/AWWA C550 Protective Epoxy Interior Coatings for Valves and Hydrants

LOUDOUN WATER REQUIREMENTS

1. **A project specific materials submittal for each insert valve must be reviewed and approved by Loudoun Water.**
2. Insert valves shall conform to either standard 1 above. Insert valves may be lined and coated per standard 2 above.
3. Insert valve shall have mechanical joint ends, and shall provide positive shut-off by means of a rubber wedge.
4. Fasteners exposed to backfill must be T304 Stainless Steel.

Company	Approval Date	Model Name/Number
Team Industrial Services, Inc.	10/2012	InsertValve™ RW-Gate

Fire Hydrant

STANDARD

1. ANSI/AWWA C502 Dry-Barrel Fire Hydrants
2. ANSI/AWWA C550 Protective Epoxy Interior Coatings for Valves and Hydrants

LOUDOUN WATER REQUIREMENTS

1. Hydrants shall conform to the standard referenced above.
2. Fire hydrants shall be of 3-way class, with one 4½-inch pumper outlet and two 2½-inch hose outlets, all with National Standard fire hose threads. The hydrant shoe shall have at least two all bronze drain outlets. The complete interior of the shoe shall be epoxy-coated if the O-ring is in contact with cast iron. If the bottom O-ring is in contact with brass, no epoxy coating of the interior of the shoe is required. Hydrants shall be furnished with a breakaway feature that will break cleanly on the underside of the flange upon impact. This shall consist of a break flange with a breakable stem coupling. Breakable bolts will not be accepted. This break flange shall also permit 360-degree rotation of the upper barrel to orient nozzles in any desired direction.
3. **Permissible bury depths are 5', 6' and 7'. Bury depth of 4' requires installation specific approval from Loudoun Water. Bury depths in excess of 7' are strictly prohibited**.

MANUFACTURERS AND MODELS

Company	Approval Date	Model Name/Number	Conditions of Approval
Kennedy Valve Manufacturing Co.	2/1998	K81D Guardian, 5-1/4"	
Mueller Company	5/1999	Super Centurion 250, 5-1/4	
American Flow Control	2/1998	B-84B, 5-1/4"	
Clow Valve	8/2015	Medallion	

Post Hydrant for Community Water System

STANDARD

1. ANSI/AWWA C502 Dry-Barrel Fire Hydrants
2. ANSI/AWWA C550 Protective Epoxy Interior Coatings for Valves and Hydrants

LOUDOUN WATER REQUIREMENTS

1. Hydrants shall conform to the standard referenced above.
2. Fire hydrants shall be 1-way, with one 2½-inch hose outlet, with National Standard fire hose threads. The hydrant shoe shall have at least two all bronze drain outlets. The complete interior of the shoe shall be epoxy-coated if the O-ring is in contact with cast iron. If the bottom O-ring is in contact with brass, no epoxy coating of the interior of the shoe is required. Hydrants shall be furnished with a breakaway feature that will break cleanly on the underside of the flange upon impact. This shall consist of a break flange with a breakable stem coupling. Breakable bolts will not be accepted. This break flange shall also permit 360-degree rotation of the upper barrel to orient nozzles in any desired direction.
3. **Permissible bury depths are 5', 6' and 7'. Bury depth of 4' requires installation specific approval from Loudoun Water. Bury depths in excess of 7' are strictly prohibited**.
4. Provide post hydrant where specified on construction plans. This will typically be in a community water system, where main is designed to deliver 500 gallons per minute or less.

MANUFACTURERS AND MODELS

Company	Approval Date	Model Name/Number
Mueller Company	8/2013	A-411

Hydrant Paint

LOUDOUN WATER REQUIREMENTS

1. Where hydrant manufacturer's coating is fusion bonded epoxy or high performance urethane, typically no recoating in the field is required.

2. Where coating or touch-up in the field is required, paint body and caps RED. Paint bonnet with reflective WHITE.

3. Use Safety Yellow for all hydrant bollards

4. Use Safety Blue for all hydrants approved for sale of water through a construction hydrant using a hydrant meter.

5. All hydrants shall be hand painted. Use of spray paint is prohibited except when coating construction hydrants safety blue.

6. In COMMUNITY WATER SYSTEMS ONLY, see construction plans for specification of flow rate. Paint hydrant body WHITE. Paint bonnet and caps RED for flow rate less than 500 gallons per minute, or ORANGE for flow rate of 500-1000 gallons per minute.

MANUFACTURERS AND MODELS

Color	Company	Approval Date	Model Name/Number
RED	Rustoleum	10/1999	#7765 Regal Red or #7564 Safety Red
WHITE	Axon Products, Inc.	11/1998	1460 Alert, Bright White Light Reflective Coating
SAFETY YELLOW	Rustoleum	1/2010	
ORANGE	Rustoleum	8/2013	
SAFETY BLUE	Rustoleum	11/2020	

Valve Box

STANDARD

1. ASTM A 48 Standard Specification for Gray Iron Castings
2. Virginia Department of Transportation Road and Bridge Specifications
3. AASHTO M 105, Class 35B

LOUDOUN WATER REQUIREMENTS

1. Boxes shall be of gray iron meeting the requirements of ASTM A48, Class 35B.
2. Two piece sliding type, unless otherwise specified on construction plans.
3. Shaft to be 5" nominal diameter. All boxes shall have on exterior a ledge under the ring that houses the cover. This is to allow the top section to be pulled upward. The upper section shall not have a flange at the bottom.
4. Manufacturer or supplier must be listed by the Virginia Department of Transportation as participating in the Department's Gray Iron Casting Manufacturers/Distributors QA/QC Program.
5. For gate valve installations, provide valve box adapter, made to specific size and manufacture of valve and valve box manufacturer. No adapter is required with butterfly valves.
6. Stacking of multiple bottom sections or extensions is prohibited. A maximum of one bottom section and one extension is permitted, below the top section. For deeper bury, use 5-inch cast iron DWV pipe as riser material.

MANUFACTURERS AND MODELS

Company	Approval Date	Model Name/Number
Bingham & Taylor	10/1999	5664
Capitol Foundry of VA, Inc.	10/1999	664A*MWW
East Jordan Iron Works, Inc.	6/2008	8555 Sections 6800 Cover
Adaptor, Inc.	1/2008	Valve Box Adaptor II (VBAII) (see Requirement 5 above)

Air Release Valve

LOUDOUN WATER REQUIREMENTS

1. Device must be combination air release and vacuum breaker.
2. Pressure rating of 150 psi or better. Must remain closed to water pressures as little as 2 psi, while allowing air to be released.
3. 2-inch NPT threaded inlet and outlet.
4. All working parts shall be constructed of non-corroding material.
5. With each air release valve, furnish 2-inch Flood Safe inflow preventer and mounting bracket by Val-Matic, in accordance with Standard Detail W-4 AIR RELEASE.

MANUFACTURERS AND MODELS

Company	Approval Date	Model Name/Number
Bermad	1/2014	2" C30 with threaded inlet and outlet Part Number C30022PSNP00000-WD

Swing Type Check Valve

STANDARD

1. ANSI/AWWA C508 Swing-Check Valves for Waterworks Service, 2-In. Through 24-In.

LOUDOUN WATER REQUIREMENTS

1. Iron body and cover with epoxy coating. Clapper to be rubber faced disc.
2. Lever and weight or cushioning mechanism as per project's plans and specifications. A project specific materials submittal must be reviewed and approved by Loudoun Water.

MANUFACTURERS AND MODELS

Company	Approval Date	Model Name/Number
Mueller Company	4/2009	A-2600 Series
VAG USA LLC (formerly GA Industries Inc.)	8/2013	200 Series

Control Valve

LOUDOUN WATER REQUIREMENTS

1. See project's plans and specifications for applicable sizes, models and options.
2. A project specific materials submittal must be reviewed and approved by Loudoun Water.
3. Rubber parts to be EPDM.
4. Trim to be stainless steel.

MANUFACTURERS AND MODELS

Company	Approval Date
CLA-VAL	10/1999

WATER, SECTION 4 – TAPPING SLEEVES AND SADDLES

Tapping Sleeve for Cast or Ductile Iron Pipe

STANDARD

1. ANSI/AWWA C110/A21.10 Ductile-Iron and Gray-Iron Fittings

LOUDOUN WATER REQUIREMENTS

1. Sleeve shall be made of ductile iron. Mechanical joint ends on all sizes.
2. Sizes up to 36" x 24". Diameter of tap may be as large as that of pipe being tapped, unless otherwise limited by Loudoun Water.
3. Bolts and nuts shall be low-alloy steel, ASTM A307 Standard Specification Carbon Steel Bolts and Studs, 60,000 psi tensile strength, Grade B.
4. Minimum pressure rating of 200 psi.

MANUFACTURERS AND MODELS

Company	Approval Date	Model Name/Number	Conditions of Approval
American Flow Control	3/8/2001	Series 2800 Compact Ductile Tapping Sleeve	
Mueller Company	10/1999	H-615	
Tyler Pipe	10/1999	Ductile Iron MJ Tapping Sleeve	
JCM Industries	9/2012	414 Steel Tapping Sleeve	approved in diameters 30" and larger; stainless steel fasteners required
Smith-Blair	12/2012	624 MJ Tapping Sleeve	approved in diameters 30" and larger; stainless steel fasteners required

Tapping Saddle

STANDARD

1. ANSI/AWWA C800 Underground Service Line Valves and Fittings

LOUDOUN WATER REQUIREMENTS

1. Saddle shall conform to the above referenced standard, and be all brass with double brass strap and rubber seal gasket.

2. Maximum tap size of 1 inch. Maximum pipe size of 12 inches, unless otherwise specified on construction plans.

3. Except as specified in item 4 below, service connections shall be by direct tap (no saddle). Use of saddle may be approved on a case-by-case basis, where direct tap has been unsuccessful.

4. Saddle required on tap of 3-inch main (where a ¾ inch tap shall be made).

MANUFACTURERS AND MODELS

Company	Approval Date	Model Name/Number
Ford Meter Box Co.	10/1999	202-B Series
Mueller Company	10/1999	BR2B Series Bronze Service Saddle

WATER, SECTION 5 – SERVICE HARDWARE

Copper Tubing

STANDARD

1. ANSI/AWWA C800 Underground Service Line Valves and Fittings

LOUDOUN WATER REQUIREMENTS

1. Type "K" soft copper, sizes ¾"-2".
2. Packaging of pancake coils through 1½"; regular coil for 2".

MANUFACTURERS AND MODELS

Company	Approval Date
Cambridge Lee Industries	10/1999
Cerro Flow Products, Inc.	10/1999
CMC Howell Metal	10/1999
KSD (By Mueller)	10/1999
Mueller Company	10/1999
KSD (By Mueller)	10/2012

Corporation Stop

STANDARD

1. ANSI/AWWA C800 Underground Service Line Valves and Fittings

LOUDOUN WATER REQUIREMENTS

2. Ball type with rating of 300 psi.

3. Must have flare outlet of same size as specified tubing.

4. Typical service connection is 1-inch tap. The ¾-inch tap is for reserved for specific applications, such as at sampling station. Where making service connection on 3-inch or 4-inch main, use corporation stop with ¾-inch inlet and 1-inch flare outlet. On 3-inch main, use an approved saddle.

MANUFACTURERS AND MODELS

Company	Approval Date	Model Name/Number
A. Y. McDonald	8/1994	74701B
Ford Meter Box Company	7/1992	FB600-4 Where tapping 3" or 4" main, use FB600-34.
Mueller Company	7/1992	B-25000
Cambridge Brass	8/2016	301NL

Meters

LOUDOUN WATER REQUIREMENTS

1. Loudoun Water carries the following meters for use. Meters 1.5-inch and larger are supplied to the Contractor for installation. Loudoun Water will install ¾- inch and 1-inch meters.

MANUFACTURERS AND MODELS

Company	Approval Date	Meter Size	Lay Lengths (inches)	Type
Sensus	6/2011	3/4" Short iPERL	7.5	Magnetic
		1" iPERL	10.75	Magnetic
		1" UL Rated iPERL	10.75	Magnetic
		1.5" OMNI Plus C2	13	Turbine
Master Meter	1/2023	2" Octave	17	Ultrasonic
		3" Octave	12	Ultrasonic
		4" Octave	14	Ultrasonic
McCrometer	1/2022	2" Ultramag	11	Magnetic
		3" Ultramag	13.4	Magnetic
		4" Ultramag	13.4	Magnetic
		6" Ultramag	14.6	Magnetic

Meter Box

LOUDOUN WATER REQUIREMENTS

1. Meter boxes to be molded plastic with white interior.

MANUFACTURERS AND MODELS

Company	Approval Date	Meter Size/Type	Model Number
Bingham & Taylor	10/2016	3/4" Short iPERL	MMP 202430
	4/2017	1" iPERL	MMP202430
	4/2020	1 ½" Omni C2**	PMP3636
Sigma Corporation	7/25//2017	3/4" Short iPERL	20" x 24" RMP 202430-FB-W full barrel
		1" iPERL	20" x 24" RMP 202430-FB-W full barrel
		1-1/2" or 2" Omni C2	36" x 36" RMP 3636-SW-W straight sided
		Double Meter	24" x 30" RMP2430-SW-W straight sided

* With this vault and aluminum cover provide 30 inch x 30 inch access door, Bilco SM-2 or Halliday F1R3030. Access door shall be bolted to aluminum cover with stainless steel bolts.

**2" removed

Meter Box Frame and Cover

STANDARD

1. ASTM A 48 Standard Specification for Gray Iron Castings

LOUDOUN WATER REQUIREMENTS

1. All frames shall conform to the above referenced standard, and be of iron meeting requirements of Class 25, or better. Country of origin must be cast into the product.

2. All covers shall be of plastic so as to enhance reading of meter by radio frequency, and feature recess with 2" hole to accommodate the meter's transponder. Covers shall be H2O rated. Wormgear assembly shall be brass or plastic.

3. Frame and cover for "**Special Applications"** to be used wherever cover has been approved to be located in concrete or asphalt pavement. Such approvals are limited to areas not subject to vehicular traffic, due to the plastic cover and meter's transponder.

MANUFACTURERS AND MODELS

Frames and Covers by A. Y. McDonald Manufacturing Company

Approval Date	Meter Size/Type	Frame	Frame for Special Applications
10/2012	3/4" Short iPERL	74R32ACRTC x800 frame and cover	74M32AC frame
10/2012	1" iPERL	74R32ACRTC x800 frame and cover	74M32AC frame
11/2001	1-1/2" Omni C2	74M36H flange and ring	74M36H flange and ring
11/2001	2" Omni C2	74M36H flange and ring	74M36H flange and ring
11/2001	Double Meter	74M24H flange and ring	74M24H flange and ring

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Frames by Bingham & Taylor

Approval Date	Meter Size/Type	Frame	Frame for Special Applications
12/2013	3/4" Short iPERL	CULF 18018ACT with CULF 18018ACB	BT-A-32C frame
12/2013	1" iPERL	CULF 18018ACT with CULF 18018ACB	BT-A-32C frame
8/2002	1-1/2" Omni C2	BT 2036 MFCH flange and ring	BT 2036 MFCH flange and ring
8/2002	2" Omni C2	BT 2036 MFCH flange and ring	BT 2036 MFCH flange and ring
8/2002	Double Meter	BT 2024 MFCH flange and ring	BT 2024 MFCH flange and ring

Frames by Ford Meter Box Company

Approval Date	Meter Size/Type	Frame	Frame for Special Applications
10/1999	3/4" Short iPERL	32B frame	A32C frame
	1" iPERL	32B frame	A32C frame
	1-1/2" Omni C2	MC36HH flange and ring	MC36HH flange and ring
	2" Omni C2	MC36HH flange and ring	MC36HH flange and ring
	Double Meter	MC24H flange and ring	MC24H flange and ring

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Frames by Vestal Manufacturing Company

Approval Date	Meter Size/Type	Frame	Frame for Special Applications
7/2003	3/4" Short iPERL		32-086 RMRC-18L frame
7/2003	1" iPERL		32-086 RMRC-18L frame
7/2003	1-1/2" Omni C2	32-090 Ex-Heavy flange and ring	32-090 Ex-Heavy flange and ring
7/2003	2" Omni C2	32-090 Ex-Heavy flange and ring	32-090 Ex-Heavy flange and ring

Frames by Sigma

Approval Date	Meter Size/Type	Frame	Frame for Special Applications
7/2014	3/4" Short iPERL	MB 12725C0	

Frames by Capital Foundry of VA, Inc.

Approval Date	Meter Size/Type	Frame	Frame for Special Applications
9/2021	1-1/2" Omni C2	36" Monitor Pit Adaptor Flange Meter Box Frame (flange and ring) MBX-1241-F and MBX-1241-(Pit Diameter)	
9/2021	2" Omni C2	36" Monitor Pit Adaptor Flange Meter Box Frame (flange and ring) MBX-1241-F and MBX-1241-(Pit Diameter)	

Covers

Approval Date	Nominal Cover Size	Manufacturer	Part Number	Cover for Special Applications
2/2012	12.5"	Nicor, Inc/Core & Main	12.5PWBLKLOUthS LC	12.5PWBLKLOUthS LC
10/2012	21.25"	Nicor, Inc/Core & Main	21.25PWBLKLOUthS	21.25PWBLKLOUthS
11/2019	12"	DFW	DFW12AFD-1WT 63D-LID	DFW12AFD-1WT 63D-LID
8/2021	12"	Bingham & Taylor	B&T "MAVERICK" Lid (Polypropylene) PLDA12.50A5TS-LW	Not Approved
10/2022	21.1875"	Trumbull	367-5605-SENS	367-5605-SENS

Underground Meter Settings

STANDARD

1. ANSI/AWWA C800 Underground Service Line Valves and Fittings

LOUDOUN WATER REQUIREMENTS

1. Connections to copper tubing by flare (except for indoor installations).
2. For double meter setting, provide U-Branch with 1" flare inlet and two ¾" M.I.P. outlets (at 7" or 7.5" spacing). Use ball angle valves with F.I.P. inlets.
3. Inlet valve and bypass valve shall have padlock wings.
4. Angle dual check valves shall meet the following:
   - Valve should be full 1-inch, with both ¾-inch and 1-inch inlets available.
   - Outlet shall be integral to the body of the device and must be for 1-inch flare connection.
   - Total height of body shall not exceed 5½ inches, as measured from bottom of outlet (not including flare nut) to center of inlet.
   - Checks shall be two 1-inch poppets, assembled in the vertical cartridge. Access must be through the top of the device.
   - Check valve must be approved under requirements of ASSE Standard 1024.
5. Vertical risers to be no lead solder joints. No pack-joints are permitted in risers. By-pass may be compression fitting.

MANUFACTURERS AND MODELS

A. Y. McDonald Manufacturing Company

Meter Size	Meter	Yoke	Expansion Connector	Angle Valve	Dual Check
3/4" Short	iPERL	14-2	714-2EHG	74602BY (1" x ¾" x 02)	7112-4YR 34
1"	iPERL	14-4	714-4EHG	74602BY (1" x 1" x 04)	7112-4YR44
1"	iPERL (Fire Service)	14-4	714-4EHG	74602BY (1" x 1" x 04)	7112-4YR44
1½"	Omni C2	Setter 720R615WWFF665			
2"	Omni C2 installed per Standard Detail W-27	Setter 720R715WWFF775			
2"	Omni C2 installed per Standard Detail W-28	720R700WWFF 777X441 FNPT x FNPT			

Ford Meter Box Company

Meter Size	Sensus Meter	Yoke	Expansion Connector	Angle Valve	Dual Check
3/4" Short	iPERL	Y502	EC-23	BA92-324W	HHCA92-424
1"	iPERL	Y504	EC-4	BA92-444W	HHCA92-424
1"	iPERL(Fire Service)	Y504	EC-4	BA92-444W	HHCA92-424
1½"	Omni C2	Coppersetter VBB76-15HB-11-66			
2"	Omni C2	Coppersetter VBB77-15HB-11-77			

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Mueller Company

Meter Size	Sensus Meter	Yoke	Expansion Connector	Angle Valve	Dual Check
3/4" Short	iPERL	H-5020	H-14234N 3/4	B24264N 5/8x3/4x1	H14465-AN, M-98
1"	iPERL	H-5040	H-14234N 1	B24264N 1	H14465-AN, M-98
1"	iPERL(Fire Service)	H-5040	H-14234N 1	B24264N 1	H14465-AN, M-98
1½"	Omni C2	Copper Meter Yoke B-2423-99000N			
2"	Omni C2	Copper Meter Yoke B-2423-99000N			

Cambridge Brass

Meter Size	Sensus Meter	Yoke	Expansion Connector	Angle Valve	Dual Check
3/4" Short	iPERL	460-2	430NL-3	210NL	500NLSR
1"	iPERL	460-4	430NL-4	210NL	500NLSR
1"	iPERL (Fire Service)	460-4	430NL-4	210NL	500NLSR
1½"	Omni C2	Meter Setter 6020NL-615F6F6-UUHB with idler			
2"	Omni C2	Meter Setter 6020NL-715F7F7-UUHB5 with idler			

Trumbull

Meter Size	Sensus Meter	Yoke	Expansion Connector	Angle Valve	Dual Check
3/4" Short	iPERL	None Approved	368-0632	None Approved	None Approved
1"	iPERL	None Approved	368-0635	None Approved	None Approved

Indoor Meter Settings

STANDARD

1. ANSI/AWWA C800 Underground Service Line Valves and Fittings

LOUDOUN WATER REQUIREMENTS

1. This section lists components required for meter settings approved by Loudoun Water to be made in accordance with these Standard Details:

   W-32 3/4" OR 1" SUBTRACTION OR INDUSTRIALPROCESS METER

   W-33 1 ½" OR 2" OMNI C2 SUBTRACTION OR INDUSTRIAL PROCESS METER

   R-15 ¾"OR 1" REUSE METER INDOORS

2. For ¾-inch or 1-inch meter, the inlet and outlet meter valves may be straight through or angle configuration.

3. Connections to customer's plumbing may be by threads, pack joint, or compression. Valves listed below with pack joint or compression inlets are for use on copper tubing (CTS outside dimensions). For connections to other pipe types, consult distributor.

4. Custom setters for 1 ½-inch and 2-inch meters come with threaded inlet and outlet.

5. Inlet valve and bypass valve (if any) shall have padlock wings.

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A. Y. McDonald Manufacturing Company

Meter Size	Meter Type	Yoke	Straight Valve	Angle Valve
3/4" Short	iPERL	14-2	Threaded Connections: 76101WY 1 x ¾ X 02	Threaded Connections: 74604BY 1 x ¾ X 02
			Pack Joint Connections: 76102WY-22 1 x ¾ X 02	Pack Joint Connections: 76102BY-22 ¾ x ¾ X 02
			McDonald Q Compression Connections: 76102WYQ ¾ x ¾ X 02	McDonald Q Compression Connections: 74602BYQ ¾ x ¾ X 02
1"	iPERL	14-4	Threaded Connections: 76101WY 1 x ¾ X 02	Threaded Connections: 74604BY 1 x 1 X 02
			Pack Joint Connections: 76102WY-22 1 x ¾ X 02	Pack Joint Connections: 76102BY-22 1 x 1 X 02
			McDonald Q Compression Connections: 76102WYQ ¾ x ¾ X 02	McDonald Q Compression Connections: 74602BYQ 1 x 1 X 02
1 ½"	Omni C2	Copper Meter Setter 720R615WWFF665		
2"	Omni C2	Copper Meter Setter 720R715WWFF775		

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Mueller Company

Meter Size	Meter Type	Yoke	Straight Valve	Angle Valve
3/4" Short	iPERL	H-5020	Threaded Connections: B-24360N 5/8 x ¾ x ¾	Threaded Connections: B-24278N 5/8 x ¾ x ¾
			Mueller Pack Joint Connections: P-24359N 5/8 x ¾ x ¾	Mueller Pack Joint Connections: P-24273N 5/8 x ¾ x ¾
			Mueller 110 Compression Connections: B-24359N 5/8 x ¾ x ¾	Mueller 110 Compression Connections: B-24273N 5/8 x ¾ x ¾
1"	iPERL	H-5040	Threaded Connections: B-24360N 1	Threaded Connections: B-24278N 1
			Mueller Pack Joint Connections: P-24359N 1	Mueller Pack Joint Connections: P-24273N 1
			Mueller 110 Compression Connections: B-24359N 1	Mueller 110 Compression Connections: B-24273N 1
1 ½"	Omni C2	Copper Meter Yoke B-2423-99000N		
2"	Omni C2	Copper Meter Yoke B-2423-99000N		

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Cambridge Brass

Meter Size	Meter Type	Yoke	Straight Valve	Angle Valve
3/4" Short	iPERL	460-2	Threaded Connections: 212NLF4SR3	Threaded Connections: 210NLF4SR3
			Pack Joint Connections: 212NLB4SR3	Pack Joint Connections: 210NLB4SR3
			Compression Connections: 212NLH3SR3	Compression Connections: 210NLH3SR3
1"	iPERL	460-4	Threaded Connections: 212NLF4SR3	Threaded Connections: 210NLF4SR3
			Pack Joint Connections: 212NLB4SR3	Pack Joint Connections: 210NLB4SR3
			Compression Connections: 212NLH3SR3	Compression Connections: 210NLH3SR3
1 ½"	Omni C2	Meter Setter 6020NL-615F6F6-UUHB with idler		
2"	Omni C2	Meter Setter 6020NL-715F7F7-UUHB5 with idler		

Double Check Backflow Prevention Assembly for Service Line Protection

STANDARD

1. ASSE 1015 Double Check Backflow Prevention Assembly

LOUDOUN WATER REQUIREMENTS

1. Any double check assembly meeting ASSE 1015 is acceptable. A partial list of examples is provided for reference.

2. For services using a 1-1/2" or larger meter and for fire lines, a backflow prevention assembly must be provided where the service line enters the structure. A reduced pressure zone device may be required in applications with fixtures of higher risk. Consult Loudoun Water's Backflow Prevention Specialist to determine the required type of device for specific applications.

MANUFACTURERS AND MODELS

Company	Approval Date	Model Name/Number	Sizes
FEBCO	10/99	856	2½" - 10"
Watts	10/99	007	¾" – 3"
Watts	10/99	709	¾" – 10"
Zurn Wilkins	10/99	950 XLT 950, 950L	¾" – 2" 2½" – 10"
Zurn Wilkins	10/99	350	4" – 6"

Reduced Pressure Backflow Prevention Assembly for Service Line Protection

STANDARD

1. ASSE 1013 Reduced Pressure Backflow Prevention Assembly.

LOUDOUN WATER REQUIREMENTS

1. Any reduced pressure backflow prevention device meeting ASSE 1013 is acceptable. A partial list of examples is provided for reference.

2. For services using a 1-1/2" or larger meter and for fire lines, a backflow prevention assembly must be provided where the service line enters the structure. A reduced pressure zone device may be required in applications with fixtures of higher risk. Consult Loudoun Water's Backflow Prevention Specialist to determine the required type of device for specific applications.

MANUFACTURERS AND MODELS

Company	Approval Date	Model Name/Number	Sizes
FEBCO	10/99	860	2½" - 10"
Watts	10/99	Series 909	¾" – 3"
Watts	10/99	Series 009	½" – 3"
Zurn Wilkins	10/99	975MS & 975BMS	2½" – 10"
Zurn Wilkins	10/99	975	2½" – 10"

Curb Stop

STANDARD

1. ANSI/AWWA C800 Underground Service Line Valves and Fittings

LOUDOUN WATER REQUIREMENTS

1. Curb stop to be ball style, full port, with quarter turn operation.
2. Where in buried service, connections to be flare.
3. In air release assembly, use threaded connections and provide handle.

MANUFACTURERS AND MODELS

Company	Approval Date	Model Name/Number
A. Y. McDonald	10/99	76100 in buried service
		76101 FH 2 in air release (includes handle)
Mueller Co.	10/99	B-25204N in buried service
		2" B-20283N in air release with handle 1" H-10298
Cambridge Brass	8/2016	202NL in buried service
		202NLHF7F7 with handle in air release

Curb Stop Box

LOUDOUN WATER REQUIREMENTS

1. Locking lid and foot piece required.

MANUFACTURERS AND MODELS

Company	Approval Date	Model Name/Number
Mueller Company	10/99	H-10316 with optional foot piece and locking lid

Sampling Station

LOUDOUN WATER REQUIREMENTS

1. Connect to main with ¾-inch tap, service line, and curb stop.

MANUFACTURERS AND MODELS

Company	Approval Date	Model Number
Kupferle Foundry/Eclipse	10/99	No. 88

Ball Valve

STANDARDS

1. ASTM B-16
2. ASTM B-145

LOUDOUN WATER REQUIREMENTS

1. Ball valves listed below are for use in indoor piping, typically in association with indoor meter settings. See construction plans and Loudoun Water's standard details for applicable placement of ball valves.
2. Valves shall be solid ball type, with 100% full port configuration and straight through flow pattern. Valve shall be one-quarter (1/4) turn operation with handle.
3. Materials of construction shall be as follows.

   valve body/bonnet: brass per ASTM B-16, bronze per ASTM B-145, or steel with epoxy coating

   ball: brass or stainless steel

   seats and packing: Teflon® or nylon

   stem: brass

   handle: steel

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MANUFACTURERS AND MODELS

Company	Approval Date	Model Numbers
American Valve	1/2010	M100 and M100S Series T200 Series 2A Series
TIPCO	6/2011	
Apollo	10/2012	

WATER, SECTION 6 – MISCELLANEOUS

Manhole Frame and Cover

STANDARD

1. ASTM A 48 Standard Specification for Gray Iron Castings
2. Virginia Department of Transportation Road and Bridge Specifications
3. AASHTO M306

LOUDOUN WATER REQUIREMENTS

1. Typical application is on manhole containing an air release valve. In this application, the cover must have a vent hole. Use Standard cover where in unpaved area. Use Heavy-duty cover in pavement.
2. Dimensions and pattern shall be the same as approved for sanitary sewer. However, lettering shall be "LOUDOUN", "LOUDOUN CO", or "LOUDOUN COUNTY"; and "WATER".
3. Frame and cover shall conform to AASHTO M 306 and be of gray iron meeting the requirements of ASTM A48, Class 35B.
4. Manufacturer or supplier must be listed by the Virginia Department of Transportation as participating in the Department's Gray Iron Casting Manufacturers/Distributors QA/QC Program.

MANUFACTURERS AND MODELS

Company	Approval Date
Chesapeake Foundries, Inc.	10/2005
East Jordan Iron Works, Inc.	10/99
Capitol Foundry of Virginia, Inc. (made by U.S. Foundry)	6/2009
U.S. Foundry and Manufacturing Corporation	6/2009

RECLAIMED WATER, SECTION 1 – PIPE

Plastic Pipe

LOUDOUN WATER REQUIREMENTS

1. Material shall conform to the STANDARDS listed for Plastic Pipe in WATER, SECTION 1 of this list.

2. Approved MANUFACTURERS AND MODELS are those listed for Plastic Pipe in WATER, SECTION 1.

3. Plastic pipe will typically be specified for general use throughout the reuse distribution.

4. See construction plans for required dimension ratio (DR). Typically DR18 or better will be specified for reclaim applications.

5. Pipe is to be purple and carry the marking "CAUTION: RECLAIMED WATER-- DO NOT DRINK" in two- to three-inch letters. Caution statement must be on opposite sides of the pipe and at intervals of three feet or less. If this caution statement is not stamped on the pipe, then apply vinyl adhesive tape with required caution statement, in accordance with the Virginia Water Reclamation and Reuse Regulation.

Ductile Iron Pipe

LOUDOUN WATER REQUIREMENTS

1. Material shall conform to the STANDARDS listed for Ductile Iron Pipe in WATER, SECTION 1 of this list.

2. Approved MANUFACTURERS AND MODELS are those listed for Ductile Iron Pipe in WATER, SECTION 1.

3. Pipe shall be Thickness Class 52 or higher, and have cement mortar lining.

4. Ductile iron pipe will be specified only for limited segments of the reuse distribution, typically for segments where restrained joints are needed. Typically such segments will include temporary terminus by blow-off, flushing hydrant assemblies, blow-off, through casings and vertical offsets.

5. Acceptable diameters are 4, 6, 8, 10, 12, and 16 inches.

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6. In reclaim installations of ductile iron, pipe must be painted purple with approved Loudoun Water 522 Coating or wrapped with purple polyethylene encasement. Pipe must carry the marking "CAUTION: RECLAIMED WATER-- DO NOT DRINK" in two- to three-inch letters. Caution statement must be on opposite sides of the pipe at intervals of three feet or less. If pipe is painted, or this caution statement is not stamped on the polyethylene encasement, then apply vinyl adhesive tape with required caution statement, in accordance with the Virginia Water Reclamation and Reuse Regulation.

Ductile Push-On Joints

LOUDOUN WATER REQUIREMENTS

1. Material shall conform to the STANDARDS listed for Ductile Push-On Joints in WATER, SECTION 1 of this list.

2. Approved MANUFACTURERS AND MODELS are those listed for Ductile Push-On Joints in WATER, SECTION 1.

Ductile Mechanical Joints

LOUDOUN WATER REQUIREMENTS

1. Material shall conform to the STANDARDS listed for Ductile Mechanical Joints in WATER, SECTION 1 of this list.

2. Approved MANUFACTURERS AND MODELS are those listed for Ductile Mechanical Joints in WATER, SECTION 1.

Ductile Flanged Joints

LOUDOUN WATER REQUIREMENTS

1. Material shall conform to the STANDARDS and all applicable REQUIREMENTS, listed for Ductile Flanged Joints in WATER, SECTION 1 of this list.

2. Approved MANUFACTURERS AND MODELS are those listed for Ductile Flanged Joints in WATER, SECTION 1.

Restrained Joint Piping Systems

LOUDOUN WATER REQUIREMENTS

1. Material shall conform to the STANDARDS and all applicable REQUIREMENTS, listed for Restrained Joint Piping Systems in WATER, SECTION 1 of this list.

2. Approved MANUFACTURERS AND MODELS are those listed for Restrained Joint Piping Systems in WATER, SECTION 1.

3. Restrained joint piping systems shall be used where specified on construction plans.

4. Restrained joint piping systems are required for installations through casings or tunnels, in conformance with Standard Detail G-12 CASING INSTALLATION.

5. Contractor shall submit project specific proposal for restrained joint piping system to Loudoun Water for review and approval. Loudoun Water reserves the right to select from the list of joints below, based upon the characteristics of the specific application.

6. Field welding of restraining components is not permitted.

Locking Gaskets

LOUDOUN WATER REQUIREMENTS

1. Material shall conform to the STANDARDS and all applicable REQUIREMENTS, listed for Locking Gaskets in WATER, SECTION 1 of this list.

2. Approved MANUFACTURERS AND MODELS are those listed for Locking Gaskets in WATER, SECTION 1.

3. Locking gaskets may be used in conformance with these Standard Details:

   G-11 RESTRAINT OF VERTICAL OFFSET

   R-3 TERMINUS BY FLUSHING HYDRANT

   R-5 REUSE FLUSHING HYDRANT BELOW GRADE / R-6 REUSE FLUSHING HYDRANT ABOVE GRADE

   R-12 2” MAGNETIC METER REUSE METER

   R-13 3’, 4” OR 6”MAGNETIC METER REUSE METER IN VAULT

   R-14 REUSE SERVICE ENTRANCE WITH INDOOR METER

Threaded Nipples

LOUDOUN WATER REQUIREMENTS

1. Material shall conform to the STANDARDS and all applicable REQUIREMENTS, listed for Threaded Nipples in WATER, SECTION 1 of this list.

2. Approved MANUFACTURERS AND MODELS are those listed for Threaded Nipples in WATER, SECTION 1.

RECLAIMED WATER, SECTION 2 – CAST AND DUCTILE FITTINGS

Compact Ductile Iron Mechanical Joint Fittings

LOUDOUN WATER REQUIREMENTS

1. Material shall conform to the STANDARDS and all applicable REQUIREMENTS, listed for Compact Ductile Mechanical Joint Fittings in WATER, SECTION 2 of this list.

2. Approved MANUFACTURERS AND MODELS are those listed for Compact Ductile Mechanical Joint Fittings in WATER, SECTION 2.

Flanged Fittings

LOUDOUN WATER REQUIREMENTS

1. Material shall conform to the STANDARDS and all applicable REQUIREMENTS, listed for Flanged Fittings in WATER, SECTION 2 of this list.

2. Approved MANUFACTURERS AND MODELS are those listed for Flanged Fittings in WATER, SECTION 2.

Tangent (Offset) Tee

LOUDOUN WATER REQUIREMENTS

1. Material shall conform to the STANDARDS and all applicable REQUIREMENTS, listed for Flanged Fittings in WATER, SECTION 2 of this list.

2. Approved MANUFACTURERS AND MODELS are those listed for Flanged Fittings in WATER, SECTION 2.

3. Tangent tees are required on mains of diameter 16” and larger, where blow-off flushing hydrant is specified.

Anchoring (Swivel) Fittings

LOUDOUN WATER REQUIREMENTS

1. Material shall conform to the STANDARDS and all applicable REQUIREMENTS, listed for Anchoring Fittings in WATER, SECTION 2 of this list.

2. Approved MANUFACTURERS AND MODELS are those listed for Anchoring Fittings in WATER, SECTION 2.

Compact Gland (M.J. Accessory Kit)

LOUDOUN WATER REQUIREMENTS

1. Material shall conform to the STANDARDS and all applicable REQUIREMENTS, listed for Compact Gland in WATER, SECTION 2 of this list.

2. Approved MANUFACTURERS AND MODELS are those listed for Compact Gland in WATER, SECTION 2.

Restraining Gland

LOUDOUN WATER REQUIREMENTS

1. Material shall conform to the STANDARDS and all applicable REQUIREMENTS, listed for Restraining Gland in WATER, SECTION 2 of this list.

2. Approved MANUFACTURERS AND MODELS are those listed for Restraining Gland in WATER, SECTION 2.

Flange by Mechanical Joint Restrained Coupling

LOUDOUN WATER REQUIREMENTS

1. Material shall conform to the STANDARDS and all applicable REQUIREMENTS, listed for Flange by Mechanical Joint Restrained Coupling in WATER, SECTION 2 of this list.

2. Approved MANUFACTURERS AND MODELS are those listed for Flange by Mechanical Joint Restrained Coupling in WATER, SECTION 2.

RECLAIMED WATER, SECTION 3 – VALVES AND FLUSHING HYDRANTS

Resilient Wedge Gate Valve

LOUDOUN WATER REQUIREMENTS

1. Material shall conform to the STANDARDS and all applicable REQUIREMENTS, listed for Resilient Wedge Gate Valve in WATER, SECTION 3 of this list.

2. Approved MANUFACTURERS AND MODELS are those listed for Resilient Wedge Gate Valve in WATER, SECTION 3.

3. In buried applications, maximum size of 12", unless construction plans specify a larger gate valve. Butterfly valves are typically employed in buried applications 16" and larger.

4. Unless otherwise specified on construction plans, ends shall be mechanical joint for buried applications. Flanged ends shall be used in buildings, in vaults, and where joining to a tapping sleeve. Threaded ends used for 2" valve of blow-off assembly.

Butterfly Valve

LOUDOUN WATER REQUIREMENTS

1. Material shall conform to the STANDARDS and all applicable REQUIREMENTS, listed for Butterfly Valve in WATER, SECTION 3 of this list.

2. Approved MANUFACTURERS AND MODELS are those listed for Butterfly Valve in WATER, SECTION 3.

3. Minimum size of 16", unless otherwise specified on construction plans.

4. Unless otherwise specified, valves with flanged ends shall be short-body, Class 250B, per ANSI/AWWA C504.

5. Valves for bury below grade shall have mechanical joint ends, and shall be Class 250B per ANSI/AWWA C504.

6. Actuators shall rotate counter-clockwise to open.

Above Grade Flushing Hydrant

STANDARD

1. ANSI/AWWA C502 Dry-Barrel Fire Hydrants
2. ANSI/AWWA C550 Protective Epoxy Interior Coatings for Valves and Hydrants

LOUDOUN WATER REQUIREMENTS

1. Flushing hydrants shall conform to the standards referenced above.
2. Flushing hydrants shall be of 3-way class, with one 4½-inch pumper outlet and two 2½-inch hose outlets, all with National Standard fire hose threads. The hydrant shoe shall have at least two all bronze drain outlets. The complete interior of the shoe shall be epoxy-coated if the O-ring is in contact with cast iron. If the bottom O-ring is in contact with brass, no epoxy coating of the interior of the shoe is required. Hydrants shall be furnished with a breakaway feature that will break cleanly on the underside of the flange upon impact. This shall consist of a break flange with a breakable stem coupling. Breakable bolts will not be accepted. This break flange shall also permit 360-degree rotation of the upper barrel to orient nozzles in any desired direction.
3. **Permissible bury depths are 5', 6' and 7'. Bury depth of 4' requires installation specific approval from Loudoun Water. Bury depths in excess of 7' are strictly prohibited**.
4. Approved MANUFACTURERS AND MODELS are those listed for Fire Hydrant in WATER, SECTION 3.

Below Grade Flushing Hydrant

STANDARD

1. ANSI/AWWA C502 Dry-Barrel Fire Hydrants

LOUDOUN WATER REQUIREMENTS

1. Flushing hydrants shall conform to the standard referenced above.
2. Below grade flushing hydrants shall be of 3-way class, with one 4½-inch pumper outlet and two 2½-inch hose outlets, all with National Standard fire hose threads. The hydrant shoe shall have at least two all bronze drain outlets. The complete interior of the shoe shall be epoxy-coated if the O-ring is in contact with cast iron. If the bottom O-ring is in contact with brass, no epoxy coating of the interior of the shoe is required.

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MANUFACTURERS AND MODELS

Company	Approval Date	Model Name/Number
Mueller Company	1/2008	A-415

Valve Box

STANDARD

1. ASTM A 48 Standard Specification for Gray Iron Castings
2. Virginia Department of Transportation Road and Bridge Specifications
3. AASHTO M 105, Class 35B

LOUDOUN WATER REQUIREMENTS

1. Boxes shall be of gray iron meeting the requirements of ASTM A48, Class 35B.
2. Two piece sliding type, unless otherwise specified on construction plans.
3. Shaft to be 5" to 5-1/4" in diameter. All boxes shall have on exterior a ledge under the ring that houses the cover. This is to allow the top section to be pulled upward. The upper section shall not have a flange at the bottom.
4. All valve boxes in reuse distribution to have square frame and cover. Cover to have raised lettering "RECLAIMED WATER".
5. For gate valve installations, provide valve box adapter, made to specific size and manufacture of valve. No adapter is required with butterfly valves.

MANUFACTURERS AND MODELS

Company	Approval Date	Model Name/Number
Bingham & Taylor	10/2013	5-1/4" Heavy Weight Square Lid with 4" Skirt #56 Square Top Section, #64 Sliding Bottom Section
Adaptor, Inc.	1/2008	Valve Box Adaptor II (VBAII) (see Requirement 5 above)
Capitol Foundry of Virginia, Inc	1/2017	#664-RW

Air Release Valve

LOUDOUN WATER REQUIREMENTS

1. Device must be combination air release and vacuum breaker.
2. Pressure rating of 150 psi or better. Must remain closed to water pressures as little as 2 psi, while allowing air to be released.
3. 2-inch NPT threaded inlet.
4. All working parts shall be constructed of non-corroding material.
5. Approved MANUFACTURERS AND MODELS are those listed for Air Release Valve in WATER, SECTION 3.

RECLAIMED WATER, SECTION 4 – SERVICE HARDWARE

Crosslinked polyethylene (PEXa) Municipal Water Service Pipe

STANDARD

1. AWWA C904 Crosslinked polyethylene pressure pipe

LOUDOUN WATER REQUIREMENTS

1. Material shall be MUNICIPEX PEXa tubing. Approved sizes are ¾", 1", 1-1/2" and 2" diameters.

2. Purple PEXa tubing to be used where specified by Loudoun Water.

3. Connections to pipe shall be by means of one of the following compression connectors: Mueller: 110 Type, A.Y McDonald: 'T' compression, Ford: Quick Joint or Cambridge: CB Style.

4. A plastic insert stiffener shall be used at each connection for ¾" and 1" pipe.

5. A stainless steel insert stiffener shall be used at each connection for 1-1/2" and 2" pipe.

Corporation Stop

LOUDOUN WATER REQUIREMENTS

1. Material shall conform to the STANDARDS and all applicable REQUIREMENTS, listed for Corporation Stop in WATER, SECTION 5 of this list.

2. Approved MANUFACTURERS AND MODELS are those listed for Corporation Stop in WATER, SECTION 5.

3. Typical service connection is 1-inch tap. The ¾-inch size is listed below for special applications, such as at sampling stations.

Meter Box

LOUDOUN WATER REQUIREMENTS

1. Where commercially available, meter boxes to be molded plastic with white or purple interior.

2. Approved MANUFACTURERS AND MODELS are those listed for Meter Box in WATER, SECTION 5.

Meter Box Frame and Cover

LOUDOUN WATER REQUIREMENTS

1. Material shall conform to the STANDARDS and all applicable REQUIREMENTS, listed for Meter Box Frame and Cover in WATER, SECTION 5 of this list.

2. Approved MANUFACTURERS AND MODELS are those listed for Meter Box Frame and Cover in WATER, SECTION 5.

3. All covers shall be of plastic so as to enhance reading of meter by radio frequency.

4. Frame and cover for **"Special Applications"** to be used wherever cover has been approved to be located in concrete or asphalt pavement.

Underground Meter Settings

STANDARD

1. ANSI/AWWA C800 Underground Service Line Valves and Fittings

LOUDOUN WATER REQUIREMENTS

1. Connections to copper tubing by flare (except for indoor installations).

2. Inlet valve and bypass valve shall have padlock wings.

3. Angle dual check valves shall meet the following:
    - Valve should be full 1-inch, with both ¾-inch and 1-inch inlets available.
    - Outlet shall be integral to the body of the device and must be for 1-inch flare connection.
    - Total height of body shall not exceed 5½ inches, as measured from bottom of outlet (not including flare nut) to center of inlet.
    - Checks shall be two 1-inch poppets, assembled in the vertical cartridge. Access must be through the top of the device.
    - Check valve must be approved under requirements of ASSE Standard 1024.

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MANUFACTURERS AND MODELS

A. Y. McDonald Manufacturing Company

Meter Size	Meter	Yoke	Expansion Connector	Angle Valve	Dual Check
3/4" Short	iPERL	14-2	714-2EHG	74602BY (1" x ¾" x 02)	7112-4YR 34
1"	iPERL	14-4	714-4EHG	74602BY (1" x 1" x 04)	7112-4YR44
2"	Ultrasonic installed per Standard Detail R-11	Setter 720R715WWFF775			
2"	Magnetic meter installed per Standard Detail R-12	No Rise Setter 720R700WWFF 777x402x442x8.12			

Ford Meter Box Company

Meter Size	Sensus Meter	Yoke	Expansion Connector	Angle Valve	Dual Check
3/4" Short	iPERL	Y502	EC-23	BA92-324W	HHCA92-424
1"	iPERL	Y504	EC-4	BA92-444W	HHCA92-424
2"	Ultrasonic installed per Standard Detail R-11	Coppersetter VBB77-12HB-11-77			

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Mueller Company

Meter Size	Sensus Meter	Yoke	Expansion Connector	Angle Valve	Dual Check
3/4" Short	iPERL	H-5020	H-14234N 3/4	B24264N 5/8x3/4x1	H14465-AN, M-98
1"	iPERL	H-5040	H-14234N 1	B24264N 1	H14465-AN, M-98
2"	Ultrasonic installed per Standard Detail R-11	Copper Meter Yoke B-2423-99000N			

Cambridge Brass

Meter Size	Sensus Meter	Yoke	Expansion Connector	Angle Valve	Dual Check
3/4" Short	iPERL	460-2	430NL-3	210NL	500NLSR
1"	iPERL	460-4	430NL-4	210NL	500NLSR
2"	Ultrasonic installed per Standard Detail R-11	Meter Setter 6020NL-715F7F7-UUHB5 with idler			

Trumbull

Meter Size	Sensus Meter	Yoke	Expansion Connector	Angle Valve	Dual Check
3/4" Short	iPERL	None Approved	368-0632	None Approved	None Approved
1"	iPERL	None Approved	368-0635	None Approved	None Approved

Indoor Meter Settings

STANDARD

1. ANSI/AWWA C800 Underground Service Line Valves and Fittings

LOUDOUN WATER REQUIREMENTS

1. This section lists components required for meter settings approved by Loudoun Water to be made in accordance with these Standard Details:

   R-15 3/4" OR 1" REUSE METER INDOORS

2. For ¾-inch or 1-inch meter, the inlet and outlet meter valves may be straight through or angle configuration.

3. Connections to customer's plumbing may be by threads, pack joint, or compression. Valves listed below with pack joint or compression inlets are for use on copper tubing (CTS outside dimensions). For connections to other pipe types, consult distributor.

4. Inlet valve and bypass valve (if any) shall have padlock wings.

5. Approved MANUFACTURERS AND MODELS are those listed for Indoor Meter Settings in WATER, SECTION 5.

Double Check Backflow Prevention Assembly for Service Line Protection

STANDARD

1. ASSE 1015 Double Check Backflow Prevention Assembly

LOUDOUN WATER REQUIREMENTS

1. Any double check assembly meeting ASSE 1015 is acceptable. A partial list of examples is provided for reference.

2. For services using a 1-1/2" or larger meter and for fire lines, a backflow prevention assembly must be provided where the service line enters the structure. A reduced pressure zone device may be required in applications with fixtures of higher risk. Consult Loudoun Water's Backflow Prevention Specialist to determine the required type of device for specific applications.

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MANUFACTURERS AND MODELS

Company	Approval Date	Model Name/Number	Sizes
FEBCO	10/99	856	2½" - 10"
Watts	10/99	007	¾" – 3"
Watts	10/99	709	¾" – 10"
Zurn Wilkins	10/99	950 XLT 950, 950L	¾" – 2" 2½" – 10"
Zurn Wilkins	10/99	350	4" – 6"

Reduced Pressure Backflow Prevention Assembly for Service Line Protection

STANDARD

1. ASSE 1013 Reduced Pressure Backflow Prevention Assembly.

LOUDOUN WATER REQUIREMENTS

1. Any reduced pressure backflow prevention device meeting ASSE 1013 is acceptable. A partial list of examples is provided for reference.

2. For services using a 1-1/2" or larger meter and for fire lines, a backflow prevention assembly must be provided where the service line enters the structure. A reduced pressure zone device may be required in applications with fixtures of higher risk. Consult Loudoun Water's Backflow Prevention Specialist to determine the required type of device for specific applications.

MANUFACTURERS AND MODELS

Company	Approval Date	Model Name/Number	Sizes
FEBCO	10/99	860	2½" - 10"
Watts	10/99	Series 909	¾" – 3"
Watts	10/99	Series 009	½" – 3"
Zurn Wilkins	10/99	975MS & 975BMS	2½" – 10"
Zurn Wilkins	10/99	975	2½" – 10"

Curb Stop

LOUDOUN WATER REQUIREMENTS

1. Material shall conform to the STANDARDS and all applicable REQUIREMENTS, listed for Curb Stop in WATER, SECTION 5 of this list.
2. Approved MANUFACTURERS AND MODELS are those listed for Curb Stop in WATER, SECTION 5.
3. In air release assembly, use threaded connections and provide handle.

Curb Stop Box

LOUDOUN WATER REQUIREMENTS

1. Material shall conform to the STANDARDS and all applicable REQUIREMENTS, listed for Curb Stop Box in WATER, SECTION 5 of this list.
2. Approved MANUFACTURERS AND MODELS are those listed for Curb Stop Box in WATER, SECTION 5.

Sampling Station

LOUDOUN WATER REQUIREMENTS

1. Sampling station components to be stainless steel.
2. Enclosure of sampling station to be purple.

MANUFACTURERS AND MODELS

Company	Approval Date	Model Number
Kupferle Foundry	10/99	Eclipse #88-SS

RECLAIMED WATER, SECTION 5 – MISCELLANEOUS

Manhole Frame and Cover

STANDARD

1. ASTM A 48 Standard Specification for Gray Iron Castings
2. Virginia Department of Transportation Road and Bridge Specifications
3. AASHTO M306

LOUDOUN WATER REQUIREMENTS

1. Typical application is on manhole containing an air release valve. In this application, the cover must have a vent hole. Use Standard cover where in unpaved area. Use Heavy-duty cover in pavement.
2. Dimensions and pattern shall be the same as approved for sanitary sewer. However, lettering shall be "LOUDOUN", "LOUDOUN CO", or "LOUDOUN COUNTY"; and "REUSE", "RECLAIM", or "RECLAIMED".
3. Frame and cover shall conform to AASHTO M 306 and be of gray iron meeting the requirements of ASTM A48, Class 35B.
4. Manufacturer or supplier must be listed by the Virginia Department of Transportation as participating in the Department's Gray Iron Casting Manufacturers/Distributors QA/QC Program.

MANUFACTURERS AND MODELS

Company	Approval Date
Chesapeake Foundries, Inc.	10/2005
East Jordan Iron Works, Inc.	10/99
Capitol Foundry of Virginia, Inc. (made by U.S. Foundry)	6/2009
U.S. Foundry and Manufacturing Corporation	6/2009

Purple Coating

LOUDOUN WATER REQUIREMENTS

1. Paint must be tinted to Pantone 522 (purple) color.
2. Use only paints listed below.

MANUFACTURERS AND MODELS

Company	Approval Date	Model Name/Number
Rustoleum	10/2016	Safety Purple

Dye for Testing

LOUDOUN WATER REQUIREMENTS

1. Dye for testing must be red in color, fluorescent and NSF certified as non-toxic.

MANUFACTURERS AND MODELS

Company	Approval Date	Model Name/Number
Presto Dye Chemical	10/2012	
Bright Dyes	10/2012	FWT Red; 200 intensity 1 pint/2500 gallons of pipe volume

SEWER, SECTION 1 - PIPE

Plastic Pipe

STANDARDS

1. ANSI/AWWA C900-16 Polyvinyl Chloride (PVC) Pressure Pipe and Fabricated Fittings, 4 In. through 12 In. (100 mm Through 1,500 mm), For Water Distribution

2. ANSI/AWWA C909 Molecularly Oriented Polyvinyl Chloride (PVCO) Pressure Pipe, 4 In. Through 12 In. (100 mm Through 300 mm), For Water Distribution

LOUDOUN WATER REQUIREMENTS

1. Pipe shall conform to one of the above standards.

2. Pipe subject to gravity flow shall have a dimension ratio (DR) of 25 or better. DR 18 may be specified on construction plans for deep or shallow installations. For diameters larger than 36 inch, dimension ratios higher than 25 will be considered on a project specific basis.

3. For pressure applications, see construction plans for dimension ratio (DR).

4. Acceptable diameters are 4, 6, 8, 10, 12, 16, 20, 24, 30, 36, 42, and 48 inches.

MANUFACTURERS AND MODELS

Company	Approval Date	Model Name/Number
IPEX, Inc.	10/1999	
National Pipe & Plastics, Inc.	10/1999	
Rehau	10/1999	AQUALOC
Royal Pipe Systems	10/1999	
Diamond Plastics Corporation	10/1999	
NAPCO/Westlake	10/1999	
	5/2025	Certa-Lok™ C900RJ/RJIB
Sanderson Pipe Corp.	3/2024	

Ductile Iron Pipe

STANDARDS

1. ANSI/AWWA C151/A21.51, Ductile-Iron Pipe, Centrifugally Cast, for Water.
2. ANSI/AWWA C111/A21.11, Rubber-Gasket Joints for Ductile-Iron Pressure Pipe and Fittings.

LOUDOUN WATER REQUIREMENTS

1. Ductile iron is not used for Loudoun Water's gravity sewer installations, unless otherwise approved by Loudoun Water. Ductile may be specified for sanitary force main and in pumping stations or treatment works. Consideration of ductile iron will be on a project specific basis.
2. Pipe shall conform to the above standards, and be Thickness Class 52 or higher. Pipe shall be clearly marked for "SEWER USE".
3. Lining to be ceramic epoxy, PROTECTO 401.
4. Joint shall be push-on bell and spigot type.
5. Acceptable diameters shall be 4, 6, 8, 10, 12, 16, 20, 24, 30, 36, 42, 48 and 54 inches.

MANUFACTURERS AND MODELS

Company	Approval Date
American Ductile Iron Pipe Co.	10/1999
Atlantic States/Clow/McWane	10/1999
U. S. Pipe	10/1999

Centrifugally Cast Fiberglass Reinforced Polymer Mortar Pipe

STANDARDS

1. ASTM D 3262

LOUDOUN WATER REQUIREMENTS

1. May be specified for gravity sewers in large diameters. Consideration to specifying this type of pipe will be given on a project specific basis.

2. Manholes are to be concrete with circular, square, rectangular, or trapezoidal bases.

MANUFACTURERS AND MODELS

Company	Approval Date
Hobas Pipe USA	10/2012

Service Pipe and Fittings

STANDARDS

1. See preceding pages of SEWER, SECTION 1 for standards applied to Plastic Pipe, Ductile Iron Pipe, and Ductile Iron Pipe Joints. See the following SEWER, SECTION 2 for standards applied to Plastic Fittings and Ductile Iron Fittings.

2. ASTM D3034, Type PSM Polyvinyl Chloride Sewer Pipe and Fittings, 4" through 15"

LOUDOUN WATER REQUIREMENTS

1. Lateral spurs shall be PVC conforming to AWWA C900-16 and of same dimension ratio (DR) as associated main, except where otherwise specified on construction plans.

2. Where cover is insufficient (typically less than four feet), lateral spurs may be specified as Ductile Iron, Class 52, lined for sewer service.

3. Building sewers (upstream of lateral spurs) shall be as follows:

    a. In all multi-family residential, commercial, institutional, and industrial applications, building sewers to be PVC DR 25 conforming to AWWA C900-16.

    b. Beyond easement, public right-of-way and pavement, building sewers serving single family residences may transition to PVC SDR35, conforming to ASTM D3034.

MANUFACTURERS AND MODELS

Refer to preceding pages in SEWER, SECTION 1 for approved manufacturers of Plastic and Ductile Iron Pipe; and SEWER, SECTION 2 for approved manufacturers of Plastic and Ductile Iron Fittings.

Pipe conforming to ASTM D 3034 SDR 35 and corresponding fittings are not for Loudoun Water's ownership, and manufacturers are not listed.

Pipe and Fittings for Low Pressure Collection

STANDARDS

1. ASTM D1785, Polyvinyl Chloride (PVC) Plastic Pipe, Schedules 40, 80 and 120
2. ASTM D2241, Polyvinyl Chloride (PVC) Pressure-Rated Pipe (SDR Series)
3. ASTM D2564, Solvent Cements for Polyvinyl Chloride (PVC) Plastic Piping Systems
4. ASTM D3139, Joints for Plastic Pressure Pipes Using Flexible Elastomeric Seals

LOUDOUN WATER REQUIREMENTS

1. Pipes and fittings of 4 inch diameter shall be polyvinyl chloride, per ASTM D2241 (Class 12454-B PVC), with integral bell end and steel pipe (IPS) outside dimensions. Dimension ratio shall be SDR 17 or better.
2. Pipe and fittings 2 inches through 3 inches shall be polyvinyl chloride, per ASTM D2241 (Class 12454-B PVC), with integral bell end and steel pipe (IPS) outside dimensions. Dimension ratio shall be SDR 17 or SDR 21.
3. Pipe joints 4 inch through 2 inches shall be push-on, per ASTM D3139, and pipe/fitting joints shall be push-on or compression/mechanical type, per ASTM D3139, except where solvent cement joints are required.
4. Sizes 1½ inches and 1-1/4 inches shall meet requirements of ASTM D1785. Pipe shall be Schedule 40 (Class 12454-B PVC), and fittings shall be Schedule 80. Joints shall be for solvent cement.
5. Solvent cement joints shall meet the requirements of ASTM D2564, and shall be appropriate solvent for the pipe materials.

MANUFACTURERS AND MODELS

Refer to preceding pages in SEWER, SECTION 1 for approved manufacturers of Plastic Pipe, and to SEWER, SECTION 2 for approved manufacturers of fittings.

SEWER, SECTION 2 – FITTINGS

Plastic Fittings for Gravity Collection Systems

STANDARDS

1. ANSI/AWWA C900-16, Polyvinyl Chloride (PVC) Pressure Pipe and Fabricated Fittings, 4 In. through 60 In., for Water Transmission and Distribution

2. ANSI/AWWA C907, Injection-Molded Polyvinyl Chloride (PVC) Pressure Fittings, 4 In. through 12 In., for Water, Wastewater, and Reclaimed Water Service

LOUDOUN WATER REQUIREMENTS

1. Injection molded fittings shall be used in lieu of fabricated fittings wherever commercially available (presently for all applications 12-inch and smaller).

2. Molded fittings shall conform to ANSI/AWWA C907 and have moderate insertion force required for assembly, such that installation by hand with block and bar is practical.

3. Fabricated Fittings for use with C900 pipe in gravity sewer applications shall be manufactured for pressure use, conforming fully to AWWA C900.

MANUFACTURERS AND MODELS

Company	Approval Date	Conditions of Approval
HARCO/Specified Fittings	9/1998 / 11/2000	
IPEX, Inc./Multi Fittings	3/2001	

Inside Drop Connection

LOUDOUN WATER REQUIREMENTS

1. Inside drop connection for use only where specified and approved by Loudoun Water. For mainline drop, use drop connection filling. Drop bowls limited to service connections, unless otherwise specified by Loudoun Water.

MANUFACTURERS AND MODELS

Company	Approval Date	Model	Conditions of Approval
HARCO / Specified Fittings	9/1998	C900-16 Drop Fitting	
RELINER/ Duran Inc.	1/2010	Inside Drop Bowl	Use on service connections only

Compact Ductile Iron Flanged and Mechanical Joint Fittings

STANDARDS

1. ANSI/AWWA C153/A21.53 Ductile-Iron Compact Fittings for Water Service

LOUDOUN WATER REQUIREMENTS

1. Ductile iron fittings are not used for Loudoun Water's gravity sewer installations. Ductile may be specified for sanitary force main, in pumping stations, or in treatment works. Consideration of ductile iron will be on a project specific basis.
2. Fittings shall conform to the standard listed above.
3. Lining to be ceramic epoxy, PROTECTO 401.
4. Minimum Pressure Class 350 in diameters 3"-24", and Class 250 in diameters 30"-48".
5. Bolts and nuts shall be in accordance with AWWA C111.
6. Fitting design shall prevent T-head bolts from rotating.
7. All sleeves shall be long pattern unless otherwise approved by Loudoun Water.
8. Approved MANUFACTURERS AND MODELS are those listed for Compact Ductile Mechanical Joint Fittings and for Flanged Fittings in WATER, SECTION 2.

Bell Harness for Restraint of PVC

LOUDOUN WATER REQUIREMENTS

1. Harness must consist of two serrated clamps, joined with threaded rods. Clamps must provide a two-directional grip on the outside of the pipe, and must no rely on the pipe bell to accomplish the restraint. Eyes receiving bolts must allow for rods have **nuts on both sides of eye**, so as to prevent both joint separation and over insertion.

MANUFACTURERS AND MODELS

Company	Approval Date	Model Number
EBAA, Inc.	10/2016	1500 Series (sizes 4" to 12") 1100HV Series (sizes 14" to 30")
Star Pipe Products	10/2016	Series 1100
Sigma	10/2016	PV-LOK™ Model PWP

Tapping Saddles for Gravity Service Connection

LOUDOUN WATER REQUIREMENTS

1. Saddle shall have cast iron body with watertight gasket sealing to existing main. Saddle must incorporate an alignment flange that protrudes into the tapping hole. Saddle to clamp to existing main with a stainless steel band and stainless steel fasteners. Saddle must incorporate a PVC hub to receive C900-16 PVC pipe. Hub to be joined to cast iron with two part urethane adhesive.

MANUFACTURERS AND MODELS

Company	Approval Date	Model Number
General Engineering Company (GENECO)	10/99	SEALTITE TEE® F-90

Tapping Saddles for Low Pressure Collection

LOUDOUN WATER REQUIREMENTS

1. Saddle to be stainless steel band.
2. Nuts and bolts shall be stainless steel.
3. Use with applicable ball corporation stop. See WATER, SECTION 5-SERVICE HARDWARE for approved manufacturers of corporation stops.

MANUFACTURERS AND MODELS

Company	Approval Date	Model Number
Smith Blair	1/2010	372 Service Saddles
Romac	1/2010	Style 306 Service Saddle

Transition Coupling for PVC to ACP (Asbestos Cement Pipe)

LOUDOUN WATER REQUIREMENTS

1. Coupling to have ductile iron body with epoxy coating. Body to be long pattern. Nuts and bolts shall be stainless steel.

2. Make field measurement of outside diameter of existing pipe as basis for ordering coupling.

MANUFACTURERS AND MODELS

Company	Approval Date	Model Number
Smith Blair	1/2013	442 Series with stainless bolts
Hymax (by Mueller)	5/2025	Hymax 2 Wide Range / Hymax 2 Long Body
Gripper Gasket	5/2025	MaxAdapter

Transition Coupling for Cast Iron Soil Pipe to PVC

LOUDOUN WATER REQUIREMENTS

1. Coupling to have ductile iron body with epoxy coating. Body to be long pattern. Nuts and bolts shall be stainless steel.

2. Make field measurement of outside diameter of existing pipe as basis for ordering coupling.

3. Prior to the introduction of PVC with C900-16 cast iron outside dimensions as Loudoun Water's preferred material for gravity sewer, service spurs were typically made of Extra Heavy Cast Iron (XHCI). Older services of 4-inch, 5-inch and 6-inch diameters may be encountered. At point of connection to new work, transition will typically be to PVC with IPS outside dimensions (Schedule 40), to start with a Schedule 40 test tee. Where 5-inch XHCI is encountered, recommended transition is by means of XHCI 5"x4" reducer, followed by a section of 4-inch XHCI. Then transition to PVC can be made using the coupling listed below.

4. Prior to the introduction of PVC as the typical material for private building sewer, services were typically made of Service Weight Cast Iron. At point of connection to new work, transition will typically be to PVC with IPS outside dimensions (Schedule 40), to start with a Schedule 40 test tee. In residential applications, transition from PVC Schedule 40 to PVC SDR 35 may be made by means of a glue bushing in Schedule 40 bell.

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MANUFACTURERS AND MODELS

Company	Approval Date	Model Number
Smith Blair	1/2013	442 Series with stainless bolts
Hymax (by Mueller)	5/2025	Hymax 2 Wide Range / Hymax 2 Long Body
Gripper Gasket	5/2025	MaxAdapter

SEWER, SECTION 3 – PRE-CAST STRUCTURES

Manhole

STANDARDS

1. ASTM C478/AASHTO M199 Precast Reinforce Concrete Manhole Sections.
2. ASTM A185 Welded Steel Wire Fabric for Concrete Reinforcement.
3. ASTM A615 Deformed and Plain Billet Steel Bars for Concrete Reinforcement.
4. VDOT Road and Bridge Specifications, Sections 105 and 302.
5. ASTM C443 Joints for Circular Concrete Sewer and Culvert Pipe Using Rubber Gaskets

LOUDOUN WATER REQUIREMENTS

1. Design to be sealed by Professional Engineer licensed in the Commonwealth of Virginia. Upon request, provide buoyancy calculations for review and approval by Loudoun Water.
2. **For all manholes greater than 5' in diameter, any manhole containing a reducing slab, all vaults, junction boxes, wet wells and structures with protective linings, provide project specific materials submittal for review and approval by Loudoun Water.**
3. Manholes to be in accordance with applicable Standard Details. Approved protective linings to be included where specified on the project's construction plans.
4. Concrete to be minimum 4,000 psi compressive strength at 28 days. Each component must be monolithic. No cold joints permitted within a piece. Base must be wet cast.
5. Unless otherwise specified, inside diameter of manhole to be 4 feet for pipes less than or equal to 24-inch; 5 feet for pipes larger that 24-inch.
6. Joints shall be made watertight with a gasket in accordance with ASTM C443.
7. Base section to be 3 feet high minimum, unless overall height of structure requires use of shorter base. Minimize number of riser sections.
8. Provide a minimum of 6 inches between pipe penetrations. Provide a minimum of 6 inches between pipe penetrations and manhole joints.
9. Rungs shall be polypropylene reinforced with steel bar. Treads are to be a minimum width of ten and three quarter inches, with no slip surface and side lugs. Rungs are to be vertically aligned at 12 inch or 16 inch spacing.
10. Pipe penetrations to be provided with approved connectors.

MANUFACTURERS AND MODELS

Company	Approval Date
Concrete Pipe & Precast, LLC (formerly Americast and Hanson Pipe & Precast, Ltd.)	10/1999
Contractors Precast Corporation	10/1999
Winchester Building Supply	8/2013
Rinker Materials	11/2025

Pipe/Structure Connector

STANDARDS

1. ASTM C-923 Resilient Connectors between Concrete Manhole Structures and Pipes.

LOUDOUN WATER REQUIREMENTS

1. Connectors must conform to the above standard.
2. For projects requiring connectors at depths exceeding 30 feet, a project specific submittal is required. Alternative manufacturers for 30+ deep connector depths may be considered.

MANUFACTURERS AND MODELS

Company	Approval Date	Model Name/Number	Conditions of Approval
A-Lok Products, Inc.	10/1999	A-LOK® PREMIUM	>12-inch pipe
International Precast Supply	11/2000	Adjustable Style, Toggle Style	
NPC, Inc./Trelleborg	10/1999	Kor-N-Seal I and II	
Press-Seal Gasket Corporation	10/1999	PSX: Positive Seal & Series 6, Press Boot	
	6/2008	PSX Direct Drive	

Concrete Protective Linings and Coatings

LOUDOUN WATER REQUIREMENTS

1. Loudoun Water will specify the acceptable lining or coating system for the specific application. Linings will be specified in new manhole installations. Coatings will be specified to protect existing structures. Coatings may also be specified in a new wet well, grinder chamber, or similar wastewater structure.

2. System shall be resistant to deterioration due to hydrogen sulfide (H2S) and its by-products. System shall include provisions to protect concrete at all discontinuities, including joints, pipe penetrations, seams, and entryways. System shall not rely on weep holes to relieve hydraulic pressure from the exterior of the structure.

3. Protective linings shall:

   - have extensions to provide for mechanical bond to concrete through positive embedment.

   - have minimum thickness of 2 mm.

4. Protective coatings to be applied in accordance with manufacturer's recommendations, including surface preparation as specified.

MANUFACTURERS AND MODELS

Company	Approval Date	Model Name/Number
Protective Linings		
Agru		Sure Grip
Protective Coatings		
Raven Lining Systems	4/2000	Epoxy Coatings
TNEMEC Series 436 Perma-Shield FR	9/2018	Epoxy Coatings
Belzona	12/1999	Polymer Coating
Poly Coating Solutions	1/2017	Versaflex 50 DM Polyurea Coating System

Manhole Chimney

LOUDOUN WATER REQUIREMENTS

1. Chimney seals:
    - Shall be furnished where watertight cover is specified on plans.
    - Shall be constructed of corrosion resistant materials.
    - May be installed on interior or exterior.
    - Shall accommodate initial height adjustment.
    - Shall be installed per manufacturer's recommendations.
2. Chimney seals may not be used to compensate for deficient or damaged masonry or grade rings.

MANUFACTURERS AND MODELS

Company	Approval Date	Model Name/Number	Conditions of Approval
Canusa		Wrapid Seal	
Cretex Specialty Products		Chimney Seal	

Adjustment Rings

LOUDOUN WATER REQUIREMENTS

1. Adjustment rings:
    - Shall be constructed of precast concrete, HDPE or rubber.
    - On site brick, block, and mortar construction shall not be permitted in lieu of rings.

Company	Approval Date	Model Name/Number	Conditions of Approval
Ladtech, Inc.		HDPE Adjusting Ring	Buried Applications Only

Precast Concrete Above-Ground Structures

STANDARDS

1. ACI 318 Building Code Requirements for Reinforced Concrete
2. CRSI Manual of Standard Practice
3. ANSI Building Code Requirements for Minimum Design Loads in Buildings and Other Structures

LOUDOUN WATER REQUIREMENTS

1. Building size, configuration, and accessories will be project specific. A materials submittal for each structure must be reviewed and approved by Loudoun Water.
2. Walls, floor, and roof shall be concrete, with architectural treatment.
3. Concrete to be 4000 psi minimum, steel reinforced.
4. Roof shall have a 3-inch overhang, sloped, with drip edge.
5. Doors shall be 1-3/4 inches thick, 18-gauge steel, painted, with locking hardware keyed to Loudoun Water standard.
6. Vents shall be 8 inches by 16 inches, with screen, all of aluminum. A minimum of two vents are required.

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MANUFACTURERS AND MODELS

Company	Approval Date	Model Name/Number
Americast/The Clear Flow Company	10/1999	Stonewall
Smith Midland	10/1999	Easi-Set Precast Building

SEWER, SECTION 4 – FRAMES AND COVERS

Cast Iron Manhole Frame and Cover

STANDARDS

1. ASTM A 48, Gray Iron
2. AASHTO M306, Standard Specifications for Drainage Structure Castings
3. Virginia Department of Transportation Road and Bridge Specification

LOUDOUN WATER REQUIREMENTS

1. Manufacturer or supplier must be listed by the Virginia Department of Transportation as participating in the Department's Gray Iron Casting Manufacturers/Distributors QA/QC Program.
2. All frames and covers shall conform to AASHTO M306 including proof load test, and shall be cast of Class 35 iron per ASTM A 48.
3. Manufacturer's name, date, heat number, place of origin, and applicable AASHTO and ASTM standards shall show on flange of frame and on underside of cover. All frames and covers shall be shipped clean and unpainted and shall have machined bearing surfaces.
4. The approved patterns listed below incorporate the following features and dimensions:
    - All frames provide a 24-inch diameter clear opening. Each cover is 25-3/4 inches in diameter, and rests in a seat of 26 inches in diameter.
    - All frames are 8 inches high, have a flange of 36-inch outside diameter, have four (4) 7/8-inch-diameter holes (for fastening to manhole), and have two (2) tapped holes to receive 5/8"-11 bolts (for fastening cover). Patterns with minor variations in height and flange diameter may be approved.
    - All covers are 1-inch thick and have diamond, non-skid surface. Covers feature 1½-inch high lettering with text "LOUDOUN", "LOUDOUN CO", or "LOUDOUN COUNTY"; and "SEWER". If construction plans call for private sewer, text to be "PRIVATE SEWER".
    - Standard cover includes two (2) 5/8-inch recessed hex head stainless steel bolts (with rubber gaskets and stainless steel washers), and have one (1) 1-inch vent hole.
    - Heavy-duty cover weighs 150 pounds minimum, and includes two (2) closed pick holes and one 1-inch vent hole.

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- Watertight cover includes ¼-inch O-ring gasket, bonded to frame; two (2) 5/8-inch recessed hex head stainless steel bolts (with rubber gasket and stainless steel washers); and two (2) stainless steel lift bar slots.

5. Cast Iron watertight covers are only permitted in areas that require a heavy-duty load rating (H20 load rating) within pavements or where so specified on construction plans.

MANUFACTURERS AND MODELS

Furnish Heavy-duty cover (H20 load rating) for all manholes in streets and other pavements. Furnish Standard cover for manholes in unpaved areas. Furnish watertight cover where so specified on construction plans.

Company	Approval Date	Style of Cover	Model Numbers
Chesapeake Foundries, Inc.	new patterns 12/2013 10/2005	Heavy-duty	LD24
		Standard	LD24E
		Watertight	LD24WT
East Jordan Ironworks, Inc.	10/1999	Heavy-duty	2028C
		Standard	2028CPT
		Watertight	2028APT
Capitol Foundry of Virginia, Inc. (made by U.S. Foundry)	6/2009	Heavy-duty	MH-247*
		Standard	MH-247*VP
		Watertight	MH-247*WT
U.S. Foundry and Manufacturing Corporation	6/2009	Heavy-duty	215 PU
		Standard	215 PV
		Watertight	215 PW

Composite Manhole Frame and Cover

STANDARDS

1. ASTM G154, UV resistant
2. ASTM D4060, Wear and Abrasion
3. AASHTO M306 H25, Proof Load

LOUDOUN WATER REQUIREMENTS

1. All frames and covers are a minimum H25 load bearing. At this time, composite frames and covers are not approved for street, parking lot or right-of-way use.
2. Manufacturer's name, country of origin (USA), and series/model number shall show on flange of frame and cover. All frames and covers shall be shipped clean and unpainted and shall have machined bearing surfaces.
3. Frames and covers shall be of uniform quality, with a general dimensional tolerance of 1/16-inch and have a protective polyurethane overmold material applied. There shall be no possibility of corrosion welding between the cover and the frame, preventing damage to the infrastructure when opening.
4. Cover shall meet ultraviolet requirements as defined in ASTM G154 (Cycle 1 for 1600 hours). Specimens shall be tested for ultimate flexural strength, retaining at least 75% of control values for load and deflection failure.
5. Frames and covers shall be tested to a fatigue performance consisting of 2 million cycles at 16,000 pounds. There shall be no visible damage and permanent deformation must not exceed 1/8-inch. Permanent deformation shall be measured at least 15 minutes after loading. The test must be performed in a manner approximating the field installation as accurately as possible. After the product has gone through the cycle test, it must then pass the proof load requirements of ASTM M306 H25.
6. Frames and covers shall be abrasion tested as defined in ASTM 4060 using a CS-17 abrasive wheel, weight of 1000g and 1000 revolutions. Weigh samples before, mid-way and after test. Sample shall not have a weight loss of greater than 0.01%.
7. The approved patterns listed below incorporate the following features and dimensions:
    - All frames provide a 24-inch diameter clear opening. Frame must be compatible with both standard and watertight cover.
    - All frames are minimum 4 inches high, have a flange of 36-inch outside diameter, and have four (4) equally spaced holes or drill dimples (for fastening to manhole). Patterns with minor variations in height and flange diameter may be approved.

- All covers are minimum 1-inch thick and have a non-skid surface. Covers feature engraved lettering with text "LOUDOUN", "LOUDOUN CO", or "LOUDOUN COUNTY"; and "SEWER". If construction plans call for private sewer, text to be "PRIVATE SEWER".

- Standard cover includes two (2) 316 stainless steel quarter turn paddle locks with penta heads, and one (1) 316 stainless steel pick bar. Provide a one (1) 1-inch vent hole in the cover. Cover shall have a protective polyurethane perimeter overmold integral to the cover. Frame shall have a protective perimeter overmold. Frame shall be bolted, and adhered and sealed to manhole using "X-Seal" polyurethane sealant manufactured by SealGuard, Inc.

- Watertight cover includes four (4) 316 stainless steel quarter turn paddle locks with penta heads, protective polyurethane perimeter overmold system integral to the cover along with a glued o-ring gasket, and one (1) 316 stainless steel pick bar. Frame shall have a protective polyurethane overmold. Frame shall be bolted, and adhered and sealed to manhole using "X-Seal" polyurethane sealant manufactured by SealGuard, Inc.

8. In all watertight applications, when a heavy-duty load rating (H20) is not required, composite watertight covers shall be provided. Composite manhole covers are not permitted in areas where vehicular traffic could impact or run over a composite cover.

MANUFACTURERS AND MODELS

Furnish Standard cover for manholes in unpaved areas. Furnish Watertight cover on all manholes in floodplain, or where so specified on construction plans.

Company	Approval Date	Style of Cover	Product Numbers
EJ Company	2/2021	Standard	COM 260346 A01 (F/C Assembly) COM 260210 (Frame) COM 260346 (Cover)
		Watertight	COM 260314 A01 (F/C Assembly) COM 260210 (Frame) COM 260314 (Cover)

Cleanout Frame and Cover

STANDARDS

1. ASTM A48 Gray Iron

LOUDOUN WATER REQUIREMENTS

1. Frame and cover shall be Class 30 or better iron per ASTM A 48. Frame to be a minimum of 8 inches in height and designed with cover to withstand H-20 truck load without damage to plastic cleanout.
2. The minimum inside diameter of the cleanout shall be 9" for installation on a 4" or 6" pipe.
3. Covers shall have a non-skid surface, lettering of "S" or "Sewer", and two closed pick holes.
4. Manufacturer's name and date shall appear on both frame and cover.
5. Frame and cover shall comply with Loudoun Water's Standard Details.

MANUFACTURERS AND MODELS

Company	Approval Date	Model Name/Number	Pipe Size
Bingham & Taylor	08/2019	Mark V Box with Heavy Rim Flange Skirt	4" or 6"
Capitol Foundry of Virginia, Inc.	10/1999	VB-9S	4" or 6"
Sigma	2/2017	MBX3491 cover in MBX3492 frame	4" or 6"
EJ	6/2021	Model 1566Z Frame (product 00156611) and Model 1566 (product 00156649 S) Cover	4" or 6"

SEWER, SECTION 5 – VALVES

Resilient Wedge Gate Valve

STANDARDS

1. ANSI/AWWA C509 Resilient-Seated Gate Valves for Water Supply Service
2. ANSI/AWWA C515 Reduced-Wall, Resilient-Seated Gate Valves for Water Supply Service
3. ANSI/AWWA C550 Protective Epoxy Interior Coatings for Valves and Hydrants

LOUDOUN WATER REQUIREMENTS

1. Gate valves shall conform to either standard 1 or 2 above. All gate valves shall be lined and coated per standard 3 above.
2. In buried applications, gate valves are to be specified, unless height of bonnet cannot be accommodated. Plug valves may be necessary for buried applications where cover on pipeline cannot accommodate a gate valve's bonnet.
3. Unless otherwise specified on construction plans, ends shall be mechanical joint for buried applications. Flanged ends shall be used in buildings and vaults.
4. Fasteners exposed to backfill (not including those of the mechanical joint ends) must be T304 Stainless Steel.
5. Valve shall have non-rising stem with O-ring seals.
6. Counter-clockwise rotation of operating nut to open. Operator to be 2-inch square nut for underground installations; with hand wheel in all buildings and vaults.

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MANUFACTURERS AND MODELS

Company	Approval Date	Model Name/Number
American Flow Control	7/2000	Series 2500
Clow/Kennedy/M &H	10/1999	
Mueller Co.	3/1999	A-2361 Series A-2362 Series
U. S. Pipe (by Mueller Co.)	2008	A-USPO
J&S Valve	6/2011	Limited Approval for Use May be included in specifications throughout all service areas, where in plant, station and vault applications.

Plug Valve

STANDARDS

LOUDOUN WATER REQUIREMENTS

1. Plug valves shall be specified primarily for applications in buildings and vaults, where special considerations preclude the accommodation of gate valves. Plug valves may be specified in underground applications, where cover on pipeline cannot accommodate a gate valve's bonnet.

2. Plug valves are also for use in low pressure collection systems in sizes 2-inch and larger.

3. Valve ends for buried applications shall be mechanical joint, in sizes 3-inch and larger, and threaded in 2-inch. Flanged ends shall be used in buildings and vaults.

4. Fasteners exposed to backfill (not including those of the mechanical joint ends) must be T304 Stainless Steel.

5. Eccentric plug valves shall be suitable for raw sewage, with full port configuration and straight through flow pattern.

6. Design working pressure shall be 150 psi.

7. Materials of construction shall be as follows:
   - Valve Body: Ductile Iron or Gray Iron
   - Plug: Resilient Faced
   - Valve Seats: Nickel
   - Bearings: Stainless Steel

MANUFACTURERS AND MODELS

Company	Approval Date	Model Name/Number
DeZurik	10/99	
Mueller/Pratt	10/99	
Clow	11/2003	
Val-Matic	4/2010	
VAG USA LLC (formerly GA Industries)	1/2014	

Ball Valve for Low Pressure Collection

STANDARDS

1. AWWA C800, Underground Service Line Valves and Fittings

LOUDOUN WATER REQUIREMENTS

1. Ball valves in size 1-1/2 inch are specified in low pressure wastewater collection systems.
2. With each valve, furnish 5-1/4" cast iron roadway box with arched bottom, model number CUL5B64SARC by Bingham & Taylor or approved equal. Cover to be marked "SEWER".
3. Valves shall be ball type, with full port configuration and straight through flow pattern. Valve shall be for buried service, one-quarter (1/4) turn operation through valve box. Valve ends shall be threaded.
4. Materials of construction shall be as follows:
   - Valve Body: Bronze
   - Ball: Brass, Fluorocarbon-Coated
   - Seals: Buna-N O-Rings

MANUFACTURERS AND MODELS

Company	Approval Date	Model Numbers
Ford Meter Box Company	10/99	Series B11
Mueller Company	10/99	B-20200
A.Y. McDonald	10/99	6101 Series

In-Line Check Valve for Low Pressure Collection

LOUDOUN WATER REQUIREMENTS

1. For use in service branch of low pressure wastewater collection systems.

MANUFACTURERS AND MODELS

Company	Approval Date	Model Numbers
Environment One	10/2012	1-1/4" Uni-Lateral Stainless Steel Lateral Valve: NA0330P04 --includes ball valve, check valve, access port, and SCH 80 adapters

Combination Air Valve

STANDARDS

LOUDOUN WATER REQUIREMENTS

1. Valve to have stainless steel body.

MANUFACTURERS AND MODELS

Company	Approval Date	Model Numbers
A.R.I.	10/99	D-020 Stainless Steel comparable valve by A.R.I to be specified where a combination device is not appropriate

Ball Float Check Valve

STANDARDS

LOUDOUN WATER REQUIREMENTS

1. For use in vents of manholes where below 100-year water surface elevation.

MANUFACTURERS AND MODELS

Company	Approval Date	Model Numbers	Conditions
JOSAM	10/99	67100A Series	
J R Smith	1/2010	Model #7080	
Wager	7/2015		Conditional Approval

SEWER, SECTION 6 – PRE-TREATMENT DEVICES

Concrete Grease Interceptors

STANDARDS

1. ACI 318 Building Code Requirements for Reinforced Concrete.
2. ASTM A185 Welded Steel Wire Fabric for Concrete Reinforcement.
3. ASTM A615 Deformed and Plain Billet Steel Bars for Concrete Reinforcement.
4. ASTM C858 Standard Specification for Underground Precast Concrete Utility Structures.
5. ASTM C890 Standard Practice for Minimum Structural Design Loading for Monolithic or Sectional Precast Concrete Water or Wastewater Structures.

LOUDOUN WATER REQUIREMENTS

1. **A project specific materials submittal must be reviewed and approved by Loudoun Water for each installation**.
2. Shop drawings and design calculations to be sealed by a Professional Engineer licensed in the Commonwealth of Virginia. Design shall meet AASHTO H-20 loading criteria.
3. Concrete mix shall provide minimum 4,000 psi compressive strength at 28 days.
4. Joints not permitted below liquid level, except in units of 3,500 gallons and larger. Joints to be interlocking type, made watertight by means of O-ring gasket or butyl rubber. Additionally, joints below liquid level to be provided with approved joint wrap on exterior.
5. Pipe penetrations must employ approved connectors (see SEWER, SECTION 3, PIPE/STRUCTURE CONNECTOR). Provide a minimum separation of 6 inches between pipe penetrations and joints.
6. The interceptor shall be partitioned and piped to provide at least two (2) skimming chambers.
7. The interceptor shall be vented to allow for air flow through the unit.
8. An effluent sampling port of 8 inch diameter shall be provided at the exit pipe of each interceptor, where effluent can be collected prior to combining with untreated flows.

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9. Each compartment must have sufficient access for cleaning and maintenance. Access risers to be of watertight construction, and have minimum 24 inch diameter for shallow bury. Where top of unit will have more than four feet of cover, access riser to be minimum 36 inches in diameter, with interlocking joints. Provide cast iron frames and covers labeled "PRIVATE SEWER". The cover may also contain 'Grease Interceptor' as well.

10. Grease interceptors are to be sealed with bitumastic sealer on the exterior of the interceptor and white drylok on the inside. Sealants are to be field applied.

MANUFACTURERS AND MODELS

Grease interceptors are owned and maintained by the owner of the building served. The owner is responsible for selecting an interceptor suited to the volume of flow and concentration of fats, oil and grease that the building will generate.

In accordance with Chapter 1064 of Loudoun County Ordinance, the building's owner is responsible for conducting routine cleaning and maintenance of the interceptor, and must ensure that discharges to the public collection system do not contain fats, grease and oils in concentrations above 100 parts per million.

Shop drawings and basis for sizing of each device must be submitted for review and approval by Loudoun Water, to ensure that it is appropriate for the intended application.

Among interceptors that are routinely specified are those listed below. Where the building's owner requests a device that is suited to the application, but is not listed below, Loudoun Water will consider the owner's selected interceptor.

Company	Approval Date	Model Name/Number
Clear Flow by CP&P	10/99	
Mayer Bros., Inc.	9/2007	1000 TRLCSA 1500 TRLCSA 2000 TRLCSA 2500 TRLCSA 3000 TRLCSA
Hanover Precast	7/2013	1000, 1500, 2000, 2500 and 3000 gallon H20 Top Load Rating, Loudoun Grease Trap Offset Baffle Limited to a maximum cover of 4 feet.

Fiberglass, Polyethylene, or Steel Grease Interceptors

LOUDOUN WATER REQUIREMENTS

1. **A project specific materials submittal must be reviewed and approved by Loudoun Water for each installation**.

2. All interceptor installations shall meet AASHTO H-20 loading criteria, regardless of the interceptor's location on the site. Where a concrete slab and/or specific bedding and backfill are needed to attain this load rating, the manufacturer of the interceptor shall provide such specifications. Shop drawings and design calculations, sealed by a licensed Professional Engineer and demonstrating adequacy under traffic loading, shall be furnished to Loudoun Water upon request.

3. Pipe penetrations must be watertight, and allow joining to pipe with fittings, and without the use of rubber coupling or no-hub band.

4. The interceptor shall be partitioned and piped to provide at least two (2) skimming chambers.

5. The interceptor shall be vented to allow for air flow through the unit.

6. An effluent sampling port of 8 inch diameter or larger shall be provided at the exit pipe of each interceptor, where effluent can be collected prior to combining with untreated flows.

7. Each compartment must have sufficient access for cleaning and maintenance. Access risers to be of watertight construction, and have minimum 24 inch diameter for shallow bury. Where top of unit will have more four feet of cover, access riser to be minimum 30 inches in diameter, with interlocking joints. Provide cast iron frames and covers labeled "PRIVATE SEWER". The cover may also contain 'Grease Interceptor' as well.

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MANUFACTURERS AND MODELS

Grease interceptors are owned and maintained by the owner of the building served. The owner is responsible for selecting an interceptor suited to the volume of flow and concentration of fats, oil and grease that the building will generate.

In accordance with Chapter 1064 of Loudoun County Ordinance, the building's owner is responsible for conducting routine cleaning and maintenance of the interceptor, and must ensure that discharges to the public collection system do not contain fats, grease and oils in concentrations above 100 parts per million.

Shop drawings and basis for sizing of each device must be submitted for review and approval by Loudoun Water, to ensure that it is appropriate for the intended application.

Among interceptors that are routinely specified are those listed below. Where the building's owner requests a device that is suited to the application, but is not listed below, Loudoun Water will consider the owner's selected interceptor.

Company	Approval Date	Model Name/Number
Zurn Proceptor™	11/2002	GMC 500-LCSA, GMC 1000-LCSA, GMC 1500(1)-LCSA, GMC 1500(2)-LCSA, GMC 2000-LCSA
Containment Solutions	10/99	
Highland Tank	10/2013	

Oil-Water-Grit Interceptors

STANDARDS

1. ACI 318 Building Code Requirements for Reinforced Concrete.
2. ASTM A185 Welded Steel Wire Fabric for Concrete Reinforcement.
3. ASTM A615 Deformed and Plain Billet Steel Bars for Concrete Reinforcement.
4. ASTM C858 Standard Specification for Underground Precast Concrete Utility Structures.
5. ASTM C890 Standard Practice for Minimum Structural Design Loading for Monolithic or Sectional Precast Concrete Water or Wastewater Structures.

LOUDOUN WATER REQUIREMENTS

1. **A project specific materials submittal must be reviewed and approved by Loudoun Water for each installation**.
2. Oil-water separator design shall incorporate coalescing plates or similar technology. Devices shall be designed and proven to produce effluent with 15 parts per million or less free oil, under normal operating conditions. Normal operating conditions consist of influents containing oils of 0.90 or lighter specific gravity, up to 20 percent (200,000 ppm) oil content in the water, and temperatures of 40° to 140° F.
3. Grit collectors shall be designed to remove sand, gravel, cinders, or other heavy solid materials that have specific gravities substantially greater than typical organic solids in wastewater. Grit collectors shall be designed with adequate access for maintenance/cleaning.
4. Shop drawings and design calculations to be sealed by Professional Engineer licensed in the Commonwealth of Virginia. Design shall meet AASHTO H-20 loading criteria.
5. Pipe penetrations must employ approved connectors.
6. The interceptor shall be vented to allow for air flow through the unit.
7. An effluent sampling port of 8 inch diameter or larger shall be provided at the exit pipe of each interceptor, where effluent can be collected prior to combining with untreated flows.
8. Joints to be interlocking type, made watertight by means of O-ring gasket or butyl rubber. Joints not permitted below liquid level.
9. If made of concrete, mix shall provide minimum 4,000 psi compressive strength at 28 days.

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10. If made of steel, provide coating and galvanic protection against corrosion.

11. Each compartment must have sufficient access for cleaning and maintenance. Access risers to be of watertight construction, and have minimum 24 inch diameter for shallow bury. Where top of unit will have more four feet of cover, access riser to be minimum 30 inches in diameter, with interlocking joints. Provide cast iron frames and covers labeled "PRIVATE SEWER". The cover may also contain 'Oil Water Separator' as well.

MANUFACTURERS AND MODELS

Oil and grit interceptors are owned and maintained by the owner of the building served. The owner is responsible for selecting an interceptor suited to the volume of flow and concentration of oil and grit that the building will generate. The owner is responsible for conducting routine cleaning and maintenance of the interceptor.

Project specific shop drawings and basis for sizing of each device must be submitted for review and approval by Loudoun Water.

Among interceptors that are routinely specified are those listed below. Where the building's owner requests a device that is suited to the application, but is not listed below, Loudoun Water will consider the owner's selected interceptor.

Company	Approval Date	Model Name/Number
Zurn Proceptor™	11/2002	OMC 500-LCSA, OMC 1000-LCSA, OMC 1500(1)-LCSA, OMC 1500(2)-LCSA, and OMC 2000-LCSA
Containment Solutions	10/99	
Clear Flow by CP&P	10/99	incorporates ecoLine-b coalescing media

SEWER, SECTION 7 – PUMPS

Grinder Pumps for Public, Low Pressure Systems

LOUDOUN WATER REQUIREMENTS

1. Grinder pump to be complete unit, ready for connection to inlet and outlet piping, and electric power supply, including the following.

    - All components to be corrosion resistant, with accessory/wet well to be fiberglass reinforced polyester or high density polyethylene, double-wall construction.
    - Pump shall be removable, semi-positive displacement type rated at 9 gpm at 138 feet TDH, 1HP, 120- or 240-Volt, 1 phase, 1725 RPM, including a grinder suitable for domestic sewage.
    - Inlet shall be for connection to 4-inch PVC pipe.
    - Discharge shall be 1¼-inch threaded stainless steel, including a check valve, a disconnect, and a ball valve.
    - Wet well shall be 60- or 120-gallon capacity, with 2-inch PVC vent.
    - Cover shall be secured with a locking mechanism or bolts.
    - Control shall be via pressure switches.
    - Audio and visual warnings shall activate when liquid level rises above alarm level.
    - The Alarm Panel shall be E/One Protect Plus. Sentry Advisor shall be included when requested by Loudoun Water.

MANUFACTURERS AND MODELS

Company	Approval Date	Model Number
Environment One Corporation	11/2013; 2/2025	Extreme Series DH071 DH151 DH152

Privately Owned Grinder Pumps

LOUDOUN WATER REQUIREMENTS

1. Private grinder pumps are installed outdoors on lots receiving public gravity sewer service, but where topography of the lot requires sewage pumping to reach the gravity service. These pumping systems are owned and maintained by the property owner.

2. Installations shall be in accordance with manufacturer's recommendations and shall include provisions to prevent flotation.

3. Grinder pump to be complete water-tight unit, ready for connection to inlet and outlet piping, and electric power supply, including the following:

    - All components to be corrosion resistant, with accessory/wet well to be fiberglass or high density polyethylene.

    - Pump shall be removable via a quick disconnect system, with head and flow characteristics suitable for the application and a grinder suitable for domestic sewage.

    - Inlet shall be for connection to 4-inch or larger PVC pipe.

    - Discharge force main shall include a check valve and a ball valve.

    - Wet well shall be vented and sized in accordance with the application, but not less than 24 inches in diameter by 36 inches deep.

    - Cover shall be fiberglass or polypropylene and shall be secured to the wet well with a locking mechanism or bolts.

    - Pump control shall be via floats or pressure switch. Electric wiring between control panel and grinder pump unit shall be installed in conduit. Control panel to have audio and visual warnings activated when liquid level rises above alarm level. Control panel shall be NEMA 4 mounted on the outside of the building. Electrical conduit shall enter the bottom of the panel with a sealed connection.

MANUFACTURERS AND MODELS

Systems meeting the requirements listed above are acceptable. Examples of suitable systems for residences are listed below. For commercial or industrial applications consult manufacturer's representative for suitable package.

Environment One	Zoeller "Shark"	Myers "Grizzly"
Interon Little Giant Pump Company "Powersewer"	Barnes Pump "EcoTRAN"	Liberty Pump