

SECTION 02622

PLASTIC STORM PIPE

PART 1 GENERAL

1.01 SUMMARY

- A. This section addresses plastic storm pipe, and includes the acceptable materials and construction practices that are to be used in the installation of plastic storm pipe.
- B. Use Polyvinyl Chloride (PVC), High Density Polyethylene (HDPE), Profile Wall Polyethylene (HDPE), Steel Reinforced Polyethylene (SRHDPE), and Polypropylene (PP) pipe as directed and accepted by the Inspector and as shown on the drawings.
- C. Related Work Specified Elsewhere:
 - 1. Section 01666 - Testing Storm Sewer System
 - 2. Section 02722 – Storm Sewer Collection System
- D. Measurement and Payment Procedures:
 - 1. For public funded capital improvement projects, measurement and payment procedures will be determined on a project by project basis.
 - 2. For privately funded development projects, Owner will determine measurement and payment requirements.

1.02 REFERENCES

- A. American Association of State Highway and Transportation Officials (AASHTO):
 - 1. M294 – Standard Specification for Corrugated Polyethylene Pipe, 300 – to 1500 m Diameter.
 - 2. M304 – Poly (Vinyl Chloride) (PVC) Profile Wall Drain Pipe and Fittings based on Controlled Inside Diameter.
 - 3. M330 Polypropylene Pipe 12- to 60-in Diameter.
- B. American Society for Testing and Materials (ASTM):
 - 1. C33 – Specification for Concrete Aggregate.
 - 2. C923 Specification for Resilient Connectors between Reinforced Concrete Manhole Structures, Pipes and Laterals.
 - 3. D448 – Classification of Sizes of Aggregate for Road and Bridge Construction.
 - 4. D1056 – Specification for Flexible Cellular Materials – Sponge or Expanded Rubber.
 - 5. D1784 – Specification for Rigid Poly (Vinyl Chloride) (PVC) Compound and Chlorinated Poly (Vinyl Chloride) (CPVC) Compounds.
 - 6. D2321 – Practice for Underground Installation of Flexible Thermoplastic Pipe for Sewers and other Gravity-Flow Applications.
 - 7. D3034 Specification for Type PSM Poly (Vinyl Chloride) (PVC) Sewer Pipe and Fittings.
 - 8. D3212 – Specifications for Joints for Drain and Sewer Plastic Pipes using Flexible Elastomeric Seals.
 - 9. D3350 – Specification for Polyethylene Plastic Pipe and Fittings Materials.
 - 10. F477 – Specification for Elastomeric Seals (Gaskets) for Joining Plastic Pipe.
 - 11. F679 – Specification for Poly (Vinyl Chloride) (PVC) Large-Diameter Plastic Gravity Sewer Pipe and Fittings.
 - 12. F794 – Specifications for Poly (Vinyl Chloride) (PVC) Profile Gravity Sewer Pipe and Fittings based on Controlled Inside Diameter.

13. F894 – Specification for Polyethylene (PE) Large Diameter Profile Wall Sewer and Drain Pipe.
14. F949 – Specification for Poly (Vinyl Chloride) (PVC) Corrugated Sewer Pipe with Smooth Interior and Fittings.
15. F1803 – Specification for Poly (Vinyl Chloride) (PVC) Closed Profile Gravity Pipe and Fittings based on Controlled Inside Diameter.
16. F2562 – Standard Specification for Steel Reinforced Thermoplastic Ribbed Pipe and Fittings for Non-Pressure Drainage and Sewerage.
17. F2881, 12 to 60 in Polypropylene (PP) Dual Wall Pipe and Fittings for Non-Pressure Storm Sewer Applications.

C. Where reference is made to one of the above standards, the latest revision shall apply

1.03 SUBMITTALS

- A. Submit to Inspector, the name of the pipe and fitting suppliers and a list of materials to be furnished.
- B. Submit to Inspector, shop drawings showing layout and details of reinforcement, joint, method of manufacture and installation of pipe, specials and fittings, and a schedule of pipe lengths (including length of individual pipes by diameter) for the entire project.
- C. Complete specifications and data covering the materials to be furnished and detailed drawings covering the installation shall be submitted to the Inspector.
- D. Prior to each shipment of pipe, submit certified test reports that pipe was manufactured and tested in accordance with the ASTM and AASHTO Standards specified herein.
- E. Submit to Engineer drawings, specifications, and other data showing complete details of the design based on AASHTO LRFD Section 30, and fabrication for review. These submittals shall include data on all materials proposed to be used in the pipe, joint details, gasket details and test results on materials, joints and pipe. All designs shall be stamped by an engineer licensed in the State of Colorado.

1.04 QUALITY ASSURANCE

- A. See SECTION 01010 – 1.08.

1.05 PRODUCT DELIVERY, STORAGE AND HANDLING

- A. Handling.
 1. Deliver and handle in a manner that will prevent damage to the pipe.
 2. Do not drop pipe or fittings.
 3. Take care to prevent damage to the pipe and fittings from bending, compression or abrasion.
 4. Do not install damaged pipe or fittings.
- B. Storage
 1. Do not store or handle lubricant in a manner that will cause contamination to the lubricant.
 2. Store rubber gaskets in a location that protects them from deterioration or damage.
 3. Store pipe in accordance with the manufacturer's specifications.
 4. Store pipe on a surface which provides even support for the pipe barrel.
 - a. Do not store pipe in such a way as to be supported by the bell.

PART 2 PRODUCTS

2.01 POLYVINYL CHLORIDE STORM PIPE (PVC)

- A. Make plastic storm pipe and all fittings from PVC compounds that conform to ASTM D1784.
- B. Unless otherwise specified on the Drawings, all gravity pipe and fittings shall conform to ASTM D3034 (4"-15"), Type PSM, SDR-35 poly (vinyl chloride); or ASTM F679 (18"-48"), Type PS-46, poly (vinyl chloride).
 - 1. Smooth interior wall. Either dual wall with exterior corrugated; ribbed with smooth interior and exterior walls; or single wall.
 - 2. The standard dimension ratio (SDR) of plastic storm pipe shall not exceed 35.
- C. All joints shall be of the push-on bell and spigot type, manufacture in accordance with ASTM D3212.
 - 1. All gaskets shall be of 0-ring type and manufactured in accordance with ASTM F477.
 - 2. All bells shall be formed integrally with the pipe and shall contain a factory installed elastomeric gasket, which is positively retained.
 - 3. Use lubricant as specified by the pipe manufacturer.
 - 4. All joints shall contain a 10.8 psig rating.
- D. PVC shall be bedded in accordance with Trenching and Bedding Standard Drawing SW-1 using CDOT class 67 gradation rock as classified by ASTM C33 or ASTM D448 or as provided on contract drawings. All trench conditions to be assumed "Ideal" unless otherwise specified by soil testing.

2.02 HIGH DENSITY POLYETHYLENE STORM PIPE (HDPE)

- A. High Density Polyethylene storm pipe and fittings shall be made from components which conform to ASTM D3350 (poly pipe material).
- B. Polyethylene storm pipe and fittings 18 inches diameter or larger shall be manufactured in accordance with AASHTO M294, type S or D.
- C. Polyethylene pipe types acceptable to the City are pipe which is:
 - 1. Manufactured by single or double continual extrusion process.
 - 2. Available with watertight fittings.
 - 3. Manufactured in it's entirety with virgin resins.
- D. All joints shall produce a watertight seal as defined in AASHTO M294, Section 7.9.3. and ASTM D3212.
 - 1. All gaskets shall be manufactured in accordance with ASTM F477.
 - 2. All bells shall be formed integrally with the pipe.
 - 3. Lubricant shall be that which is specified by the pipe manufacturer.
 - 4. All joints shall contain a 10.8 psig rating.
- E. Joints as provided on contract drawing, accepted by the City, or specified by manufacturer.
- F. HDPE pipe connections to concrete structures – use water stop gasket or manhole boot meeting requirements of ASTM C923 installed to manufactures requirements.

2.03 PROFILE WALL POLYETHYLENE STORM PIPE (HDPE)

- A. The Profile Wall storm pipe shall only be manufactured from a virgin high density polyethylene material, which meets or exceeds the minimum cell classification requirements for base materials as specified in

ASTM F894 when classified in accordance with ASTM D3350. Manufacturer shall certify that the materials used to manufacture pipe and fittings meet these requirements.

- B. The pipe manufacturers Quality System shall be certified as meeting the requirements of an ISO 9001:2000 Quality management system, by a qualified independent body.
- C. The pipe and pipe fittings shall be manufactured with dimensions and tolerances in accordance with the manufacturer's internal manufacturing standard. The pipe must meet the requirements of ASTM F894 when the pipe is marked as such. The nominal inside diameter of the pipe shall be true to the specified pipe size. The pipe shall be manufactured by the continuous winding of a closed profile onto suitably sized mandrels. It shall be produced to constant internal diameters.
- D. Joints between profile cut "end treatments" on pipes and fittings shall be made in the field using appropriate extrusion welding procedures. Each individual performing welding must be acknowledged by the Manufacturer as having the necessary skills to undertake the work.
 - 1. The manual extrusion welding of all joints must be performed to the specification of the pipe manufacturer's policies and procedures.
 - 2. All Joints must be Fully restrained.
 - 3. Fittings – including Wyes, Tees, Elbows and other custom fittings, shall be produced at the manufacturer's facilities. On site joining shall be carried out as described above.
- E. Profile Wall HDPE Pipe connections to concrete structure – Pipe shall be connected to the manhole by removing the outside surface of the profile wall of the pipe for a minimum of two (2) profile turns. This is to facilitate a mechanical lock between the pipe and the grout used to seal the pipe opening in the concrete manhole. Low shrink grout should be used. Since a watertight connection is always required, an elastomeric or hydrophilic (recommended) gasket material shall be placed around the pipe but within the pipe opening area of the manhole that is to be grouted. As before, low shrink grout should be used. The gasket supplier's recommendations regarding gasket material thickness and installation details shall be followed. Other means may be used to provide a seal as approved by the Project Engineer. Resilient Connectors per ASTM C1478 can be used as an acceptable alternative.

2.04 STEEL REINFORCED POLYETHYLENE STORM PIPE (SRHDPE)

- A. Virgin high density pressure-rated resins are used to manufacture steel reinforced polyethylene pipe and complimentary fabricated fittings. Resins shall conform to the minimum requirements of cell classification 345464C as defined and described in the latest version of ASTM D3350 "Standard Specification for Polyethylene Pipe and Fittings Materials".
- B. Steel Reinforced Polyethylene storm pipe for 24" diameter and larger shall be manufactured in accordance with ASTM F2562.
- C. All Joints shall produce a watertight seal as defined in ASTM F2562 and ASTM D3212. All gasket material shall be manufactured in accordance with ASTM F477.
- D. Steel Reinforced Polyethylene storm pipe connections to concrete structure – Pipe shall be connected to the manhole by grouting in place with a non-shrink or low shrink grout that indexes ribbing section to provide a mechanical lock between the pipe and the grout used to seal the pipe opening in the concrete manhole. A gasket or butyl strip material, as recommended by the manufacturer, can be used to fill the valley of the ribs to provide a water tight connection as necessary. Other means may be used to provide a seal as approved by the Project Engineer.

2.05 POLYPROPYLENE STORM PIPE (PP)

- A. Pipe and fittings shall be made of virgin polypropylene compounds meeting or exceeding the requirements of Table 1 in AASHTO M330 Section 6.1.1. Polypropylene compounds shall be comprised of the base polypropylene resin and all additives, colorants, UV inhibitors, and stabilizers.
- B. Polypropylene storm pipe and fittings 18” and larger shall be manufactured in accordance with AASHTO M330 and ASTM F2881.
- C. Polypropylene pipe types acceptable to the City shall be manufactured by single or double continual extrusion process and be available with water tight fittings.
- D. All joints shall conform to the requirements of ASTM D3212, Joints for Drain and Plastic Pipes Using Flexible Elastomeric Seals. Watertight joints shall be joined with a gasketed bell and spigot joint meeting the requirements of ASTM F2881 18 - through 60-inch and shall be watertight per the requirements of ASTM D3212. Spigots shall have gaskets meeting the requirements of ASTM F477. Gaskets shall be installed by the pipe manufacturer and installed with a removable, protective wrap to ensure the gasket is free from debris. A joint lubricant available from the manufacturer shall be used on the bell and gasket during assembly.
- E. Polypropylene pipe connections to structures shall use a water stop gasket in a grouted connection.

PART 3 EXECUTION

3.01 TRENCHING, BACKFILLING AND COMPACTING:

- A. Trenching, bedding, backfilling and compacting of pipe shall be as specified in Section 02221.

3.02 INSTALLATION:

- A. Pipe Installation: See Section 02722 and the following.
 - 1. Install in accordance with ASTM D2321 as modified by Section 02722.

3.03 TESTING

- A. Pipe testing shall be as specified in Section 01666 and the following.
- B. For possible deflection testing, see Section 01666, paragraph 3.05.

END OF SECTION