**SECTION 2.2**

**TECHNICAL Specification FOR**

**RESTrAINED JOINT POLYVINYLCHLORIDE (PVC) Water PIPE**

**PART 1: GENERAL**

**1.1 Scope of Work**

This specification covers restrained joint polyvinyl chloride (PVC) Pipe to be used for pressure-rated potable water distribution system.

**1.2 Pipe Description**

Pipe supplier shall furnish restrained joint PVC pipe as manufactured by CertainTeed Corporation, or approved equal conforming to all standards and procedures, and meeting all testing and material properties as described in this specification.

**PART 2: QUALITY ASSURANCE**

**2.1 Reference**

### Unless otherwise stated, the latest editions of the following documents are applicable for this specification:

ASTM D 1784 Standard Specification for Rigid PVC Compounds and

 Chlorinated PVC Compounds

 ASTM D 2837 Standard Test Method for Obtaining Hydrostatic Design

 Basis for Thermoplastic Pipe Materials

 ASTM F 477 Standard Specification for Joints for Plastic Pressure

 Pipes Using Flexible Elastomeric Seals

AWWA C900 Standard for Polyvinyl Chloride (PVC) Pressure Pipe and Fabricated Fittings, 4 In. through 12 In. (100 mm through 300 mm), for Water Distribution

NSF 61 Drinking Water System Components – Health Effects

**2.2 Warranty**

* A one-year warranty for the pipe shall be provided from the Contractor and shall cover the cost of replacement pipe and freight to project site, should the pipe have any defects in material or workmanship.
	+ - * Unless otherwise specified, the warranty periods shall begin after the Certificate of Acceptance is issued for the contract.

**2.3 Pre-Construction Submittals**

 The following product data is required from the pipe supplier identifying or verifying following items:

* + - * + Name of pipe manufacturer
				+ Pipe diameter
				+ Dimension Ratio (DR) of 14 or as per plans
				+ Pressure Class per applicable standards
				+ Color
				+ Confirmation/ Recommended minimum bending radius
				+ Confirmation/ Recommended maximum safe pull force

**PART 3: Products**

**3.1 Pipe**

* The pipe material must meet AWWA C900 standards for PVC pressure pipe and fittings with a dimension ratio of DR14. PVC pipe that is intended for use as a casing pipe may have the dimension ratio of 18.
* Pipe and couplings shall be made from unplasticized PVC compounds having a minimum cell classification of 12454, as defined in ASTM D 1784.  The compound shall qualify for a Hydrostatic Design Basis (HDB) of 4000 psi for water at 73.4 degrees F, in accordance with the requirements of ASTM D 2837.  Restrained joint water pipe shall carry the UL1285 listing.
* Pipe shall be joined using non-metallic couplings to form an integral system for maximum reliability and interchangeability. High-strength, flexible thermoplastic splines shall be inserted into mating, precision machined grooves in the pipe and coupling to provide full 360° restraint with evenly distributed loading.
* Cut exposed splines 3/4" from coupling to reduce soil drag.
* Couplings shall be beveled as part of the manufacturing process on the leading edges so as to minimize soil friction.
	1. **Maximum Allowable Pull-in Force**

Adhere to, using Certa-Lok C900/RJ pipe or approved equal, the pipe manufacturer's most current data regarding tensile load limitations for trenchless application. Generally, the maximum pull in force must not exceed the following values.

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
| PipeDia.(in) | DimensionRatio(DR) | Max. Working Pressure(psi) | PipeO.D.(in) | Coupling O.D.(in) | Max. Pull-in Force Tightest(Bending)(lbs.) | Max. Pull-in Force Straight(No Bending)(lbs.) |
| 4 | 14 | 305 | 4.800 | 5.964 | 8,000 | 10,300 |
| 6 | 14 | 305 | 6.900 | 8.366 | 9,300 | 14,700 |
| 8 | 14 | 305 | 9.050 | 10.947 | 18,900 | 28,800 |
| 10 | 14 | 305 | 11.100 | 13.361 | 24,900 | 38.300 |
| 12 | 14 | 305 | 13.200 | 15.836 | 28,300 | 48,300 |

**3.3 Minimum Bending Radius**

Adhere to the following data regarding radius of curvature for Certa-Lok C900/RJ pipe used for trenchless application. The confirmation of proposed radius of each bore has to be part of the required submittal prior to work.

|  |  |  |
| --- | --- | --- |
| PipeDiameter(in) | Minimum Radiusof Curvature(ft.) | Change in Pitch per 10 ft. (%) |
| 4 | 100 | 10.0 |
| 6 | 150 | 6.7 |
| 8 | 200 | 5.0 |
| 10 | 250 | 4.0 |
| 12 | 375 | 3.3 |

In any case, the deflection radius must not exceed 75% of the maximum allowable curvature allowed for standard C-900 PVC pipe.

**Part 4: Requirements**

**4.1 General**

Products delivered under this specification shall be manufactured only from new water distribution pipe and couplings conforming to AWWA C900. The restrained joint pipe system shall also meet all short and long term pressure test requirements of AWWA C900. Pipe, couplings, and locking splines shall be completely non-metallic to eliminate corrosion problems.

**4.2 Materials**

Pipe and couplings shall be made from unplasticized PVC compounds having a minimum cell classification of 12454, as defined in ASTM D 1784. The compound shall qualify for a Hydrostatic Design Basis (HDB) of 4000 psi for water at 73.4°F, in accordance with the requirements of ASTM D 2837.

**4.3 Approvals**

Restrained joint PVC pipe products shall be tested by an independent third party laboratory for continuous use at rated pressures. Copies of agency approval reports or product listings shall be provided to the Owner. Products intended for contact with potable water shall be evaluated, tested, and certified for conformance with NSF 61 by an acceptable certifying organization.

**4.4 Dimensions**

Nominal outside diameters and wall thicknesses of restrained joint pipe shall conform to the requirements of AWWA C900. Unless otherwise specified on the plans restrained joint pipe shall be furnished in 4", 6", 8", 10" and 12" sizes Class 305 (DR14). Pipe shall be furnished in standard lengths of 20 feet.

**4.5 Joints**

* Pipe shall be joined using non-metallic couplings to form an integral system for maximum reliability and interchangeability. High-strength, flexible thermoplastic splines shall be inserted into mating, precision machined grooves in the pipe and coupling to provide full 360° restraint with evenly distributed loading.
* Couplings shall be designed for use at or above the pressure class of the pipe with which they are utilized, and shall incorporate twin elastomeric sealing gaskets meeting the requirements of ASTM F 477. Joints shall be designed to meet the zero leakage test requirements of ASTM D 3139 or the Owner’s requirements which is more stringent.

**4.6 Workmanship**

Pipe and couplings shall be homogeneous throughout and free from voids, cracks, inclusions and other defects, and shall be as uniform as commercially practicable in color, density and other physical characteristics.

**4.7 Quality Control**

Pipe and machined couplings must pass AWWA C900 hydrostatic proof test requirements. Test frequency to be in accordance with C900 and/or UL requirements.

|  |  |  |
| --- | --- | --- |
| Dimension Ratio(DR) | Pressure Class(psi) | Hydrostatic Test Pressure(psi) |
| 4 | 305 | 610 |

**4.8 Marking**

Pipe and couplings shall be legibly and permanently marked in ink with the following minimum information:

**Pipe**

* Nominal size (for example, 4")
* PVC
* Dimension ratio (for example, DR14)
* AWWA/UL pressure class (for example, PC 235)
* AWWA C900-07 (or latest edition)
* Manufacturer’s name or trademark and production record code
* Seal(mark) of the testing agency verifying the suitability of the pipe Material for potable water service
* Seal (mark) of the certifying agencies that have tested and
* approved the pipe for use in fire protection systems

**Couplings**

* Nominal size (for example, 4")
* PVC
* AWWA/UL pressure class (for example, PC 305)
* AWWA C900-07 (or latest edition)
* Manufacturer’s name or trademark
* Seal (mark) of the testing agency verifying the suitability of the pipe material for potable water service
* Seal (mark) of the certifying agencies which have tested and approved the pipe for use in fire protection systems.

**PART 5: METHOD OF MEASUREMENT AND PAYMENT**

Method of Measurement and Payment for the work included in this section will be in accordance with the payment schedule in the Bid Proposal.

**\*\*END OF SECTION\*\***