

Special Specification 1023

Pressure Irrigation Polyvinyl Chloride (PVC) Pipe



1. DESCRIPTION

Furnish and install polyvinyl chloride (PVC) pipe for a pressure irrigation pipe system. The pipe will be the sizes, types, and dimensions shown on the plans and will include all connections and joints to new or existing pipes and other appurtenances as required to complete the work.

2. MATERIALS

Furnish materials in accordance with the following:

- Item 400, "Excavation and Backfill for Structures"
- Item 401, "Flowable Backfill"
- Item 464, "Reinforced Concrete Pipe" or Item 4024, "Reinforced Concrete Low-Head Pressure Pipe"
- Item 467, "Safety End Treatment."

Unless otherwise shown on the plans, pressure irrigation PVC pipe and joint fittings must conform to the following:

Provide PVC pipe manufactured from virgin PVC compounds in accordance with ASTM D1784 cell class 12454B, and meeting the requirements of ASTM D2241.

Contractor must furnish the Engineer with manufacturer documentation certifying that the pressure irrigation PVC pipe and joint fittings comply with the requirements of this Item. All pipe must be marked with the ASTM resin cell classification and the date of manufacture.

3. INSPECTION

The quality of materials, the process of manufacture, and the finished pipe will be subject to inspection and approval by the Engineer at the manufacturing plant. In addition, the finished pipe will be subject to further inspection by the Engineer at the project site prior to and during installation.

4. SECTION PROPERTIES

Contractor must provide PVC pipe that meets the following minimum values of pipe wall thickness for 100 psi. in accordance with Table 1.

Table 1
Polyvinyl Chloride Pipe (PVC)

Nominal Pipe Diameter (in.)	Min. Wall Thickness (in.)	Weight (lb. per ft.)
6	0.150	1.9
8	0.199	3.3
10	0.249	5.2
12	0.299	7.5
15	0.373	11.7
18	0.456	17.6
21	0.538	24.6
24	0.605	32.4

5. JOINTS

Joints must maintain pipe alignment and prevent infiltration of material during the life of the installation. Joints will consist of an external sleeve and gasket system or an integral gasketed system, and must conform to ASTM D3139. Gasket material must conform to either ASTM D1056 or ASTM F477.

6. CONSTRUCTION

Only trench installation of pressure irrigation PVC pipe will be permitted, except where pressure irrigation PVC pipe is placed in casing pipe meeting the requirements of Item 464, "Reinforced Concrete Pipe" or Item 4024, "Reinforced Concrete Low-Head Pressure Pipe."

- 6.1. **Excavation.** All excavation must be in accordance with the requirements of Item 400, "Excavation and Backfill for Structures."
- 6.2. **Shaping and Bedding.** The pipe must be bedded in a foundation of compacted cohesionless material, such as sand, crushed stone, or pea gravel, with maximum size not exceeding 3/8 in. This material must extend a minimal of 6 in. below the outermost corrugations or ribs, and must be carefully and accurately shaped to fit the lowest part of the pipe exterior for at least 10% of the overall height. When requested by the Engineer, the Contractor must furnish a template for each size and shape of pipe to be placed for use in checking the shaping of the bedding. The template must consist of a thin plate or board cut to match the lower half of the cross-section of the pipe.
- 6.3. **Laying Pipe.** Unless otherwise approved by the Engineer, the laying of pipes on the bedding must start at the outlet end with the separate sections firmly joined together. Proper facilities must be provided for hoisting and lowering the section of the pipe into the trench without damaging the pipe or disturbing the bedding and side of the trench. Any pipe which is not in alignment or which shows any undue settlement after laying must be removed and relayed at the Contractor's expense.

Multiple installation of pressure irrigation PVC pipe must be laid with the centerlines of individual barrels parallel. Unless otherwise shown on the plans, the following clear distances between outer surfaces of adjacent pipes must be maintained, in accordance with Table 2.

Table 2
Required Clear Distances

Nominal Pipe Diameter (in.)	Clear Distance Between Pipes
18	1 ft. 2 in.
24	1 ft. 5 in.
30	1 ft. 8 in.
36	1 ft. 11 in.

- 6.4. **Reuse of Existing Appurtenances.** When existing appurtenances are shown on the plans for reuse, the portion to be reused will be severed and moved to the new position previously prepared, by approved methods.

Connections must conform to the requirements for joining sections of pipes as indicated here or as shown on the plans. Any existing appurtenances damaged during moving operations must be restored to their original condition at the Contractor's expense. The Contractor, if he so desires, may remove and dispose of the existing headwalls and aprons and construct new headwalls at his own expense, in accordance with the pertinent specifications and design indicated on the plans or as furnished by the Engineer.

- 6.5. **Connections and Stub Ends.** Connections of irrigation pipe to existing irrigation or appurtenance will be as shown on the plans or as directed. The bottom of the existing structure must be mortared or concreted if necessary, to eliminate any drainage pockets created by the new connection. Where the sewer is connected into existing structures which are to remain in service, any damage to the existing structure resulting from making the connection must be restored by the Contractor to the satisfactions of the Engineer. Stub ends, for

connections to future work not shown on the plans, must be sealed by installing watertight plugs into the free end of the pipe.

- 6.6. **Backfilling.** Particular attention is necessary when backfilling PVC pipe. After the pipe structure has been installed as required by the plan details it must be backfilled according to the following, except where it is placed in steel casing:

Type I. Backfill consists of Item 401, "Flowable Backfill." The flowable backfill must be placed across the entire width of the trench and must maintain a minimum depth of 12 in. above the pipe.

Type II. Backfill consists of a cohesionless material, such as sand, crushed stone, or pea gravel, and having a maximum size not to exceed 3/8 in. The backfill material must be placed along both sides of the completed structures to a depth of 12 in. above the pipe. The backfill must be placed in uniform layers not exceeding 6 in. in depth (loose measurement), wetted if required, and thoroughly compacted between adjacent structures and between the structure and the sides of the trench. Until a minimum cover of 12 in. is obtained, only hand operated tamping equipment will be allowed within vertical planes 2 ft. beyond the horizontal projection of the outside surfaces of the structure.

All pipe, excluding private driveway and side road culvert pipe, must be backfilled with Type I backfill. For private driveway and side road culvert pipe the Contractor must have the option of using either Type I or Type II backfill.

Any backfill above Type I or Type II backfill material must be placed in accordance with Item 400, "Excavation and Backfill for Structures." If Type I backfill is used a minimum of 24 hr. must elapse before backfilling the remaining portion of the trench with backfill material in accordance with Item 400, "Excavation and Backfill for Structures."

During the backfilling operations, special emphasis is placed upon the need for obtaining uniform backfill material and uniform compacted density throughout the length of the structure so that unequal pressure will be avoided. Extreme care is to be taken to insure proper backfill under the structure (haunch zone).

- 6.7. **Protection of Pipe.** Unless otherwise shown on the plans or permitted in writing by the Engineer, no heavy earth moving equipment will be permitted to be hauled over the structure until a minimum of 4 ft. of compacted fill (permanent or temporary) has been placed over the top of the structure.

Prior to adding each new layer of loose backfill material, until a minimum of 12 in. of cover is obtained, an inspection will be made of the inside periphery of the structure for local or unequal deformation caused by improper construction methods. Evidence of such will require corrective measures as directed by the Engineer.

Pipe damaged by the Contractor must be removed and replaced by the Contractor at no additional cost to the Department.

- 6.8. **Treatment of Exposed Ends of Pipe.** All exposed ends of the pipe must be treated with concrete safety end treatment or metal end treatment as shown on the plans and conforming to the Item 467, "Safety End Treatment."

7. MEASUREMENT

- 7.1. This Item will be measured by the foot. Such measurements will be made between the ends of the barrel along its flow line, exclusive of safety end treatments. Safety end treatments must be measured in accordance with Item 467, "Safety End Treatment." Where spurs, branches or connections to existing pipe lines are involved, measurement of the spur or new connecting pipe will be made from the intersection of its flow line with the outside surface of the pipe into which it connects. Where inlets, headwalls, catch basins,

manholes, junction chambers, or other structures are included in lines of pipe, that length of pipe tying into the structure wall will be included for measurement but no other portion of the structure length or width will be so included.

- 7.2. For multiple pipes, the measured length will be the sum of the lengths of the barrels, measured as prescribed above.
- 7.3. This is a plans quantity measurement Item and the quantity to be paid for will be that quantity shown in the proposal and on the "Estimate and Quantity" sheet of the contract plans, except as may be modified by Article 9.2. If no adjustment of quantities is required additional measurements or calculations will not be required.
- 7.4. Flowable backfill will not be measured, but considered subsidiary to this Item.

8. PAYMENT

- 8.1. The work performed and materials furnished in accordance with this Item and measured as provided under "Measurement" will be paid for at the unit price bid for "Pressure Irrigation PVC Pipe (Type I backfill)," of the size specified or "Pressure Irrigation PVC Pipe (Type I or II backfill)," of the size specified or "Pressure Irrigation PVC Pipe," of the size specified. This price will be full compensation for furnishing, hauling, placing and joining of pipes; for all connections to new or existing structures, for moving and reusing headwalls where required; for removing and disposing of portions of existing structures as required; for the bedding and Type I or II backfill material as required; for cutting of pipe ends on skew; and for all labor, tools, equipment and incidentals necessary to complete the work.
- 8.2. Excavation and backfill above the Type I or II backfill will be paid for in accordance with Item 400, "Excavation and Backfill for Structures."
- 8.3. Safety end treatment will be paid for in accordance with Item 467, "Safety End Treatment."
- 8.4. Casing pipe will be paid for in accordance with Item 464, "Reinforced Concrete Pipe" or Item 4024, "Reinforced Concrete Low-Head Pressure Pipe."