

WATER DISTRIBUTION SPECIFICATIONS
For
The Town of Lake Placid

1.00 Polyvinylchloride Pipe:

- 1.01 Polyvinylchloride pipe smaller than 4 inches shall conform to the requirements of ASTM D-1785, Schedule 40 or ASTM Designation D 2241, Latest Revision.
- 1.02 Polyvinylchloride (PVC) pipe 4 inches and larger in diameter shall conform to the requirements of AWWA C900, latest revision, Class 150, DR 18.
- 1.03 All fittings on PVC pipe shall be Mega-Lug type or approved alternate.

2.00 High Density Polyethylene Pipe (HDPE)

- 2.01 Materials used for the manufacture of high density polyethylene pipe and fittings shall be categorized as extra high molecular weight and meet all requirements of ASTM D3350. The high density polyethylene material shall be a cell class of PE345464C per ASTM D3350 and shall be assigned a Plastics Pipe Institute (PPI) recommended designation of PE3408. Pipe manufacturer shall be a member in good standing of the Plastic Pipe Institute.
- 2.02 Pipe and Fittings - Pipe and fittings shall be manufactured from material meeting the requirements of 1.1. The manufacturer shall certify that samples of the manufacturer's production product have been tested in-house in accordance with ASTM D2837, and validated in accordance with the latest revision of PPI TR-3.
 - 1) Manufacturer shall comply with AWWA Standard C901 (1/2" through 3") and C906 (4" through 63"). The manufacturer shall comply with NSF Standard 61 and/or Standard 14 and must be certified by the NSF International for potable water. The material shall be listed by the Plastics Pipe Institute (PPI) a division of The Society of the Plastics Industry in PPI TR-4. The pipe material shall have a Hydrostatic Design Basis of 1600 psi at 73.40 F and 800 psi at 1400 F. The PPI listing shall be in the name of the pipe manufacturer and testing and validation of samples of the pipe manufacturers' product shall be based upon ASTM D2837 and PPI TR-3.
 - 2) Reference Standards: AWWA, C-901, AWWA C-906, ASTM D2683, ASTM D3261, ASTM D3350, PPI TR-3, PPI TR-4 and NSF Standard 61.
- 2.03 Both pipe and fittings shall carry the same pressure rating. All fittings shall be pressure rated to match the system piping to which they are joined. At the point of fusion, the outside diameter and minimum wall thickness of the fitting shall meet the outside diameter and minimum wall thickness specifications of ASTM F714 for the

same size of pipe. All fittings shall be properly derated according to manufacturer's written recommendations, and clearly labeled on the fitting as such. Manufacturer shall have a written specification for all standard fittings which establishes Quality Control criteria and tolerances. The manufacturer of the pipe shall be the same manufacturer of the fabricated fittings and other fabrications. The manufacturer shall certify that the materials used to manufacture pipe and fittings meet the requirements of this specification.

- 2.04 The pipe shall have product traceability. This shall be accomplished by the inclusion of a product code into the print line of all products. This shall notate the manufacturer, the date of manufacture, the lot and supplier of raw material, the location of manufacture, and the production shift on which the product was produced.
- 2.05 Pipe and fittings shall be butt fusible according to the manufacturer recommended procedures. The socket or sidewall fittings shall also be to manufacturer's recommended procedures. Pipe and fittings may also be joined with flanged adapters and convoluted ductile iron rings. Mechanical fittings acceptable for use with polyethylene pipe shall follow the recommendations of the mechanical fittings manufacturer.

3.00 Ductile Iron Pipe:

- 3.01 Ductile iron pipe shall conform to AWWA C 151, latest revision (ANSI Standards A 21.51). The minimum pipe class selected shall conform to AWWA C150, latest revision (ANSI Standards A21.50, Table 50.5) for a 350 psi working pressure.
- 3.02 Pipe interior shall have a bituminous seal coat over a cement mortar lining conforming to AWWA C104-74 (ANSI Standard A21.4). Exterior of pipe shall have a bituminous coating.
- 3.03 Fittings:
 - 1) All ductile iron fittings shall be mechanical joint or single gasket, push-on type with a minimum pressure rating of 200 psi, and shall conform to the requirements of ANSI Standards A21.10.
 - 2) Mechanical joint and/or single gasket, push-on type fittings shall be cement lined, seal coated inside and outside as specified above for ductile iron pipe.
- 3.04 Joints: Mechanical joints consisting of bell, socket, gland, gasket, bolts, and nuts shall conform to ANSI Standard A21.11. Bolts shall be high strength, annealed, cast iron, T-head type having hexagonal nuts. Bolts and nuts shall be machined true and nuts shall be tapped at right angles to a smooth bearing surface. Single seal gasket push-on joints shall conform to the requirements of ANSI A21.11.

- 3.05 Gaskets: Gaskets shall be vulcanized crude rubber or polyvinylchloride plastisol. Gaskets shall have plain tips unless otherwise specified.
- 3.06 Prevention of Electrolysis: Where deemed necessary, electrolytic action through the contact of dissimilar metals shall be prevented by either:
- 1) the separation of one material from the other by means of an insulating or dielectric coupling; or
 - 2) the use of alternative materials, as directed by the Project Engineer.

4.00 Gate Valves:

Gate Valves shall be ANSI/AWWA C509, iron body, non-rising stem with square nut, single wedge, resilient seat, flanged mechanical joint ends, control rod, post indicator, extension box and valve key. All fittings shall be Mega-Lug type or approved alternate.

5.00 Valve Boxes:

Cast iron valve boxes shall be provided for all valves installed underground. The valve boxes shall be adjustable to fit the depth of earth cover over the valves and shall be designed so as to prevent the transmission of surface loads directly to the valve or piping. Valve boxes shall have an interior diameter of not less than 5 inches. The valve boxes shall be so constructed as to prevent tipping or rattling.

6.00 Fire Hydrants:

- 6.01 A 6 inch auxiliary gate valve with extension type box shall be located between the water main and the hydrant. All working parts shall be of cast iron and high grade bronze. All hose threads shall be National Standard threads.
- 6.02 Any hydrants equipped with drains for freeze plugs shall be permanently plugged.
- 6.03 Fire hydrants shall be for 6 inch pipe connectors with 5 inch valve opening.
- 6.04 Hydrants shall be the compression type with 2 piece standpipe-breakable steam coupling and flange, and be equipped with two 2 inch hose nozzles and one 4 inch pumper nozzle and shall open counterclockwise. All hose threads shall be National Standard Threads. The hydrant shall be equipped with a standard 1 inch pentagon operating nut. All hydrants shall have a lubricated stem. Hydrants with operating stem threads located in the waterway will not be accepted. All fire hydrants shall be designed for 150 pounds working pressure and shall conform to AWWA Specification C-502. Hydrants shall be factory primed with a rust inhibiting prime and shall be painted with a finish coat of rustproof paint after installation. The

hydrant will be so designed to permit removal of all working parts from the hydrant up through the barrel without disturbing the earth around the hydrant or disassembling the barrel. Hydrants shall be as manufactured by US Pipe, American, Kennedy, Mueller, or approved equal.

6.05 All fittings shall be Mega-Lug (EBBA only) type or approved alternate.

7.00 Service Connections and Water Meters:

7.01 Curb stops shall be bronze of the type shown on the technical illustrations (Mueller or Ford only). Water meters shall be installed by the Town of Lake Placid Utilities Department. The minimum service line size for a single service shall be one inch. For a double service, the minimum size to the wye shall be 1-1/2 inches, and one inch minimum to the curb stop.

7.02 Water service tubing less than 2 inches diameter shall be polyethylene only and must conform to ASTM D2666. PVC Service lines shall be Schedule 40 PVC, ASTM D-1785.

8.00 Concrete:

Concrete for thrust blocks shall have a compressive strength of not less than 2500 psi after 28 days.

9.00 Back Flow Preventors:

Backflow prevention devices installed on customer's service lines at the point of delivery (service connection) shall be of a type in accordance with AWWA Specification C506-78 or its latest revision.

10.00 Tests, Inspection, and Repairs:

10.01 All materials shall be tested in accordance with the applicable Federal, ASTM, or AWWA Specification and the basis for rejection shall be as specified therein. Certified copies of the tests shall be submitted with each shipment of material.

10.02 All materials will be subject to inspection and approved by the Project Engineer after delivery and no broken, cracked, misshapen, imperfectly coated, or otherwise damaged, or unsatisfactory material shall be used.

10.03 All material found during the progress of the work to have cracks, flaws, or other defects shall be rejected and promptly removed from the site.

10.04 If damage occurs to any pipe, fittings, valves, hydrants, or water main

accessories in handling, the damage shall be immediately brought to the Project Engineer's attention. The Project Engineer shall prescribe corrective repairs, or rejection of the damaged items.

11.0 Construction:

11.01 Excavating the trench:

A) As a general rule, do not open the trench too far ahead of the pipe laying so as to: avoid possibly flooding the trench, reduce or eliminate pumping or sheeting, reduce caving caused by ground water, reduce potential workmen and traffic hazards.

B) The trench width at the ground surface may vary with and depend upon the depth, type of soils and position of surface structures. The minimum clear width of the trench in the pipe zone should be one foot greater than the outside diameter of the pipe. The maximum clear width of the trench at the top of the pipe should not exceed a width equal to the pipe diameter plus two feet. If the above defined trench widths must be exceeded or if the pipe is installed in a compacted embankment, pipe embedment should be compacted to a point of at least 2.5 pipe diameters on both sides of the pipe or to the trench walls, whichever is less.

C) Minimum cover for the top of the pipe is 36 inches below the finished grade.

D) The trench bottom should be smooth and free from large stones, rocks or large dirt clods. Excavation of bells should be provided so that the pipe is uniformly supported along its length. Usually, loose material left by the excavator on the trench bottom will be adequate for bedding the pipe barrel and providing full support. When rock or other non-cushioning material is encountered, excavation shall be extended to 6 inches below the outside bottom of the pipe and a bedding cushion of sand or other selected backfill used as the pipe bed.

11.02 Pipe Laying:

A) Water shall not be allowed in the trenches while the pipes are being laid and/or tested. The Contractor shall not open up more trench than the available pumping facilities are able to dewater to the satisfaction of the Engineer. The Contractor shall assume responsibility for disposing of all water so as not to injure or interfere with the normal drainage of the territory in which he is working. In no case shall pipelines be used as drains for such water, and the ends of the pipe shall be kept properly and adequately blocked during construction by the use of approved stoppers and not by improvised equipment. All necessary precautions shall be taken to prevent the entrance of mud, sand, or obstructing matter into the pipelines. If on completion of the work, any such material has entered the pipelines, it must be cleaned as directed by the Engineer so that the entire system will be left clean and unobstructed.

B) Cleanliness: The interior of the pipe shall be thoroughly cleaned of all foreign matter before being gently lowered into the trench and shall be kept clean during the laying operations by means of plugs or other approved methods. During suspension of work for any reason at any time, a suitable stopper shall be placed in the end of the pipe last laid to prevent mud or other foreign material from entering the pipe.

C) Gradient: Lines shall be laid straight, and depth of cover shall be maintained uniform with respect to finish grade, whether grading is either completed or proposed at time of pipe installation. When a grade of slope is shown on the drawings, batter boards with string line paralleling design grade, or other previously approved means, shall be used by the Contractor to assure conformance to required grade. All pipe shall be laid within ½ pipe diameter of lines and grades indicated.

D) Pipe Joint Deflection: Whenever it is desirable to deflect pipe, the amount of deflection shall not exceed the following maximum limits: a) for ductile iron pipe, AWWA Standard C900; b) for PVC pipe, no deflection is allowed at the joints, and longitudinal deflection is limited to the maximum shown in AWWA Publication M23. Additionally, joint deflection for ductile iron pipe shall not exceed the maximum allowed by the manufacturer.

E) PVC Pipe Storage: Polyvinylchloride pipe exterior may be damaged by prolonged exposure to direct sunlight and the Contractor shall take necessary precautions during storage and installation to avoid this damage. Pipe shall be stored under cover and sufficient backfill to shield from the sun shall be placed as the pipe is installed.

F) Joint Compounds: No sulphur base joint compound shall be used.

G) Anchors: Concrete thrust blocks shall be placed at all bends, tees, plugs, and other fittings to provide lateral support. Thrust blocks shall conform to the details shown on the illustrative standards. Concrete shall have a compressive strength of 2500 psi after 28 days, and shall have a minimum curing time of 3 days. The poured concrete shall be left exposed for a minimum of 24 hours before backfilling and not more than 48 hours.

H) Joints: The joints of all pipelines shall be made absolutely tight. The particular joint shall be approved by the Project Engineer prior to installation. Where shown on plans or where, in the opinion of the Project Engineer, settlement or vibration is likely to occur; all pipe joints shall be bolted, or retained accordingly.

I) Mechanical Joints: All types of mechanical joints shall be laid and jointed in full conformance with manufacturer's recommendations. Only especially skilled workmen shall be permitted to make up mechanical joints. Torque wrenches set as specified in AWWA Specification C111-72, shall be used; or spanner-type wrenches not longer than specified therein may be used with the permission of the Engineer.

J) Push-On Joints: Push-on joints shall be made in strict, complete compliance with the manufacturer's recommendations. Lubricant, if required, shall be an inert, nontoxic, water-soluble compound incapable of harboring, supporting, or culturing bacterial life. Manufacturer's recommendations shall be submitted to Engineer for review and approval before work is begun.

K) Polyvinylchloride Pipe Joints: The joints of all pipelines shall be made in conformity with the recommendations of the pipe manufacturer. The particular joint used shall be approved by the Engineer prior to installation.

L) Installing Valves and Boxes:

1) Valves: Valves shall be carefully inspected, opened wide and then tightly closed and the various nuts and bolts shall be tested for tightness. Special care shall be taken to prevent any foreign matter from becoming lodged in the valve seat. Gate valves, unless shown otherwise, shall be set with their stems vertically above the centerline of the pipe. Butterfly valves shall have the disc shaft installed horizontally. Any valve that does not operate correctly shall be removed and replaced.

2) Valve Boxes: Valve boxes shall be carefully centered over the operating nuts of the valves so as to permit a valve key to be fitted easily to the operating nut. In areas to be paved, valve boxes shall be set to conform to the level of the finished surface and held in position by a ring of concrete placed under the support flange as shown on the illustrative standards. The valve box shall not transmit surface loads to the pipe or valve. Care shall be taken to prevent earth and other material from entering the valve box. Any valve box which is out of alignment or the top does not conform to the finished ground surface shall be dug out and reset. Before final acceptance of the work all valve boxes shall be adjusted to finish grade.

M) Installing Hydrants:

1) Hydrants shall be set plumb and in true alignment with mains. They shall be securely braced against the end of the trench with concrete thrust blocks as shown on the drawings. Care shall be taken to insure the free drainage of the hydrant barrel and, to this end; coarse material shall be placed around the drain outlet. Backfill around hydrant shall be thoroughly compacted so as to support the hydrant securely.

2) The pumper nozzle shall be perpendicular to the edge of pavement or curb. Nozzles shall be at least 18 inches and not more than 24 inches above the ground. Hydrants shall be located horizontally off the edge of pavement the required distance to meet roadside clear zone widths per the FDOT

Manual of Uniform Minimum Standards for Design, Construction and Maintenance for Streets and Highways, latest edition.

3) All fire hydrants shall be painted with a high grade enamel, Federal Safety Yellow, or Safety Red (OSHA), above the ground line.

4) All fittings shall be Mega-Lug type or approved alternate.

N) Taps:

1) All materials supplied, and drilling and tapping equipment used to make taps shall be sterilized.

2) After the tapping sleeve and valve have been installed and before the tap is made, the sleeve will be tested to ensure a watertight joint. A test plug will be provided in the sleeve, and after the sleeve has been installed, it will be filled with water and the pressure increased to between 150 and 190 psi. All leaking joints will be repaired.

O) Concrete Encasement: Concrete encasement shall be constructed in accordance with details shown on the drawings using 2500 psi minimum compressive strength concrete. Encasement shall be constructed where:

1) the water line crosses under, or at a depth which provides less than 18 inches clear distance between pipes when crossing over sewer lines; encasement shall extend a minimum of ten feet on each side of the point of crossing; or

2) the Engineer shall order the line encased.

The points of beginning and ending of pipe encasement shall be not more than 6 inches from a pipe joint to protect the pipe from cracking due to uneven settlement of its foundation, or the effects of superimposed live loads.

P) Flushing: All water mains shall be flushed to remove all sand and other foreign matter. The velocity of the flushing water shall be at least 4 feet per second. Flushing shall be terminated at the direction of the Engineer. The Contractor shall dispose of the flushing water without causing a nuisance or property damage.

Q) Disinfection: Before the system is put into operation, all water mains and appurtenances and any item of new construction with which the water comes in contact, shall be thoroughly disinfected.

1) Disinfecting Agent: The disinfecting agent shall be liquid chlorine, sodium hypochlorite solution conforming to Federal Specifications O-S-

602b, Grade D or dry hypochlorite, commonly known as "HTH" or "Perchloron".

2) Flushing Agent: Prior to the application of the disinfecting agent, all mains shall be thoroughly flushed. Flushing shall continue until clean water flows from the fire hydrants. Where hydrants are not available for flushing, such flushing shall be accomplished with the installation of 2 inch "blow-offs" at the ends of the lines. Flushing water shall be clean and potable.

3) Disinfection Procedure: All piping, valves, fittings, and all other appurtenances shall be disinfected with potable water containing a minimum chlorine concentration of 75 ppm at any point in the system. This solution shall then remain in the distribution system for a minimum contact period of 8 hours before it is flushed out. All valves in the lines being disinfected shall be opened and closed several times during the contact period, individual service lines shall be opened momentarily to flush each service with chlorinated water.

4) Residual Chlorine Tests: After the disinfection outlined above has been accomplished, flushing shall continue until residual chlorine tests less than 0.2 ppm. Residual chlorine test shall be in accordance with standard methods using a standard orthotoladine test set.

5) Bacterial Tests: Including pH and chlorine residual, see testing note on the plans

a) After the water system has been disinfected and thoroughly flushed as specified herein, the Contractor shall take samples of water from remote points of the distribution system in sterile containers. The Contractor shall forward the samples to the Department of Health and Rehabilitation Services, or an approved laboratory for bacterial examination. If tests of such samples indicate the presence of coli form organisms, the disinfection as outlined above shall be repeated until tests indicate the absence of such pollution. The bacterial tests shall be satisfactorily completed before the system is placed in operation and it shall be the Contractor's responsibility to obtain satisfactory samples.

b) If methods of disinfection differ materially from those outlined above, such methods shall be in accordance with directives of the Department of Health and Rehabilitative Services and all methods shall have the approval of the Engineer. Definite instruction as to the collection and shipment of samples shall be secured from the Department of Health and Rehabilitative Services prior to disinfection and shall be followed in all respects. The Contractor shall secure final approval of the bacterial samples from the

Department of Health and Rehabilitative Services before the water distribution system is put into operation.

R) Connection to Existing System: All connections to existing mains shall be made after complete disinfection of the proposed system and shall be made under the direction of the Owners of the existing system. Valves separating the mains being installed from existing mains shall be kept closed and only operated by or under the direction of the owners of the existing system.

S) Hydrostatic Tests:

A. PVC

1) All components of the water distribution system, including fittings, hydrants, services, connections, and valves shall be hydrostatic tested. Specific distribution system components including fittings, valves, and hydrants, shall remain uncovered until tested and approved, provided, however, that pipe trenches under traveled streets or roads may be backfilled with the permission of the Engineer. No testing shall be done until all concrete thrust blocking is in place and set. If high early strength concrete is used, testing may be conducted 48 hours after the concrete is placed; otherwise, thrust block concrete must cure 5 days before pressure testing commences. In testing, the part of the system under test shall be filled with potable water and subjected to a sustained pressure of 150 psi. The piping shall be tested in sections, thereby testing each valve for secure closure. While the system is being filled, air shall be carefully and completely exhausted. If permanent air vents are not located at all high points, the Contractor shall install corporation stops or fittings and valves at such points so the air can be expelled as the pipe system is slowly filled with water.

2) Test pressure shall be maintained by pumping for at least one hour and until all sections under test have been checked for evidence of leakage. Rate of loss shall not exceed that specified below, "Allowable Limits For Leakage". Visible leaks shall be corrected regardless of total leakage shown by test.

3) The system as a whole, or any part, shall be tested prior to construction of any subdivision roadway or pavement over the water system.

4) The system as a whole, or any part, shall be retested after completion of backfilling when it is believed necessary, as directed by the Project Engineer. The system shall also be retested upon completion of subdivision roadway or other pavement construction that is constructed over the water system.

5) All pumps, gauges, and measuring devices shall be furnished, installed, and operated by the Contractor and all such equipment and devices and their installation shall be approved by the Project Engineer. All pressures and

leakage testing shall be done in the presence of a representative of the Engineer.

6) Water for testing and flushing shall be potable water provided by the Contractor from a source approved by the Project Engineer.

7) Allowable Limits For Leakage: The hydrostatic pressure tests shall be performed as specified and no installation, or section thereof, will be acceptable until the leakage is less than the number of gallons per hour as determined by the formula {see Appendix "A"}:

$$L = \frac{\{N * D * \sqrt{P}\}}{7400}$$

in which,

L = Allowable leakage, in gallons per hour

N = Approximate number of joints in the section of main being tested

D = Pipe diameter; in inches

P = The average test pressure during the test, in gauge psi

* = Times or multiplied by.

B. HDPE

Testing High Density Polyethylene (HDPE) pipe:

After all free air is removed from the test section, raise the pressure at a steady rate to the required pressure. The pressure in the section shall be measured as close as possible to the lowest point of the test section. Test pressure should not exceed 1.5 times the rated operating pressure of the pipe or the lowest rated component in the system. Initially, the pipe should be raised to test pressure and allowed to stand without makeup pressure for a sufficient time to allow for expansion of the pipe. This usually occurs within 2-3 hours. After equilibrium is established, the test section is pressurized to 1.5 times operating pressure, the pump is turned off, and the final test pressure is held for 2 hours polyethylene pipe holds pressure by developing stress in its walls. This process continues throughout the test period, and the pipe increases slightly in diameter. Pressure drop will occur due to continued expansion of the pipe during the second phase of the test. A drop in pressure during the test phase is common and does not prove with absolute certainty that a leak or failure is present in the system. Polyethylene pipe is tested by measuring the "make up" water required to return the section to test pressure. Allowable amounts of makeup water for expansion during the pressure test are shown in the table below. If the pressure is not returned within the allowable volume of water, the test fails. If there are no visual leaks or significant pressure drops during the final test period, the pipeline passes the test.

Note: Under no circumstances shall the total time under the test exceed eight (8) hours at 1.5 times the pressure rating of the lowest rated component in the system. If the test is not completed due to leakage, equipment failure, etc., the test section shall be allowed to "relax" for eight (8) hours prior to the next test.

Nominal Pipe Size (inches)	Allowed Loss for Expansion of HDPE Pipe in a 2 hour test in gallons per 100 fee of pipe
3	0.15
4	0.25
6	0.60
8	1.0
10	1.3
11	2.0
12	2.3
14	2.8
16	3.3
18	4.3
20	5.5
22	7.0
24	8.8
28	11.1
32	14.3
36	18.0
40	22.0
48	27.0

T) Pipe Locator

All pipe shall be laid with metal locator tape buried one foot above and parallel to the pipe centerline. The locator tape shall be at least 2 inches wide with aluminum backing and shall be lettered, "CAUTION: WATER LINE BURIED BELOW".

And

All pipe shall be laid with a 12 gauge solid copper locating wire with PVC coating buried on top of the pipe. Wire and installation shall meet National Electrical Code Federal Specification J-C-308.

TOWN OF LAKE PLACID UTILITIES DEPARTMENT
Water and Force Main Pressure Test Report
(PVC Pipe)

Project Name: _____

Job Number: _____ Location: _____

Starting Time of Test: _____ Starting Pressure (psi): _____
(150 psi min.)

Ending Time of Test: _____ Ending Pressure (psi): _____
(150 psi min.)

Duration of Test Minutes: _____ (120 min.) Average Test Pressure (psi): _____

Computation for Allowable Leakage	Pipe Diameter (Use separate column for each pipe size)					
	1	2	3	4	5	6
D = Diameter of tested pipe (inches)						
N = Number of Joints						
P = Average test pressure (psig)						
Allowable pipe leakage (gal/hr)						
$L = \frac{\{N * D * \sqrt{P}\}}{7400}$						

Total Allowable Leakage Equals _____ Gallons

Measured Leakage Equals _____ Gallons

The above test does / (does not) meet the requirements.

Remarks: _____

Test Witnessed By: Inspector: _____ Date: _____

Engineer: _____ Date: _____

Utility/Contractor: _____ Date: _____

Appendix "A"