

# **Watermain Material Specifications**

## **Village of Morton, Morton, Illinois**

*(Revised August 2025 – CD, LKB)*

### **Table of Contents**

|                                                          |         |
|----------------------------------------------------------|---------|
| GENERAL: .....                                           | Page 2  |
| WATERMAIN PIPE: Ductile Iron.....                        | Page 2  |
| GATE VALVES:.....                                        | Page 3  |
| HYDRANTS:.....                                           | Page 4  |
| STANDARD SPECIFICATION FOR FIRE HYDANT INSTALLATION..... | Page 5  |
| WATERMAIN FITTINGS.....                                  | Page 6  |
| RETAINER FITTINGS (GLANDS).....                          | Page 6  |
| JOINT RESTRAINT DEVICES.....                             | Page 7  |
| RESIDENTIAL SERVICE PIPE.....                            | Page 8  |
| NEW SUBDIVISION RESIDENTIAL PIPING STANDARD.....         | Page 9  |
| BRASS FITTINGS for ALL RESIDENTIAL SERVICES.....         | Page 10 |
| COMMERCIAL SERVICE PIPE.....                             | Page 11 |

## GENERAL:

- 1) All Watermain Materials incorporated into the Village of Morton Water Distribution System shall be of Domestic Manufacture (i.e. manufactured within the boundaries of the United States) and shall meet all applicable specifications of the **American Water Works Association (AWWA)**.

NOTE: The Village of Morton Water Distribution System consists of watermain piping, service and any appurtenances maintained by the Village of Morton up to the outlet of the curb stop (service valve).

- 2) A Material Listing shall be made available upon request to the Village of Morton and include the following:

*Material Description, Name of the Manufacture  
and the Name of the Supplier*

## WATERMAIN PIPE:

All pipe used for watermain shall be:

- 1) **Ductile Iron with Bell and Spigot Joints** (either 'Tyton' or 'Fastite').

Watermain pipe will be supplied with proper gaskets and lubrication.

All Ductile Iron pipe supplied for watermain shall be a minimum:  
Class 50 for 8" and larger and Class 52 for 4" and 6"

- 2) **High Density Polyethylene (HDPE) pipe:** Refer to HDPE Watermain Installation Standards for approved HDPE Pipe and Material and Installation Standards.

## GATE VALVES:

- 1) Valves shall meet the AWWA C515 standard with the valve body, bonnet, wedge, stuffing box and operating nut constructed of ductile iron.

Additionally, all valves shall be:

...Resilient wedge type rated for 250 psig, cold working pressure. The ductile iron wedge shall be one piece casting covered internally and externally with EPDM rubber. The wedge shall be symmetrical and seal equally well in either flow direction.

...Valves shall be **NSF Standard 61** certified.

...The stem shall be sealed by three O-rings. The top two O-rings shall be replaceable under full operating pressure with the valve in the full open position.

...All internal and external surfaces of the valve body and bonnet shall have a fusion-bonded coating that complies with the **ANSI/AWWA C550** standard.

...All bolts and nuts shall be 304 stainless, factory-installed and not smaller than 5/8" in diameter. All bolts and nuts shall be hex head inch sizes. (Socket head and metric not allowed)

**NOTE:** The following valves meet the above criteria and are approved for use in the Village of Morton Water System:

**...American Flow Control Series 2500-1** and

**...Mueller A-2361 RWGV MJ x MJ**

- 2) All MJ Valve shall be supplied with approved retainer fittings, gaskets and accessories. Valves with **Romac-Alpha Ends** or **Mueller Hymax Grip Restraint** are an alternate restraint joint connection.
- 3) All valves shall be supplied with U.S. Made, 5 1/4", 'Screw-type' Cast Iron Valve Boxes (such as: 'Tyler' and 'Jordon' brands) with a Lid that has **WATER** inscribed on it.
- 4) All valve boxes shall be installed on valves by use of a
  - Valve Box Adapter II as manufactured by:  
Adaptor Inc., 2151 South 54<sup>th</sup>. Street,  
West Allis, Wisconsin, 53219 (414) 764-6733  
or equal, sized for the valve application

## HYDRANTS

- 1) All new hydrants shall be:  
    3-Way, (2)- 2 ½ ", (1) 4 ½" Nozzles  
    National Standard Threads  
    Open Left  
    16" Upper Standpipe (for Pacer)  
    with 6" MJ Boot

The following are approved hydrants for use in the Village of Morton Water System:

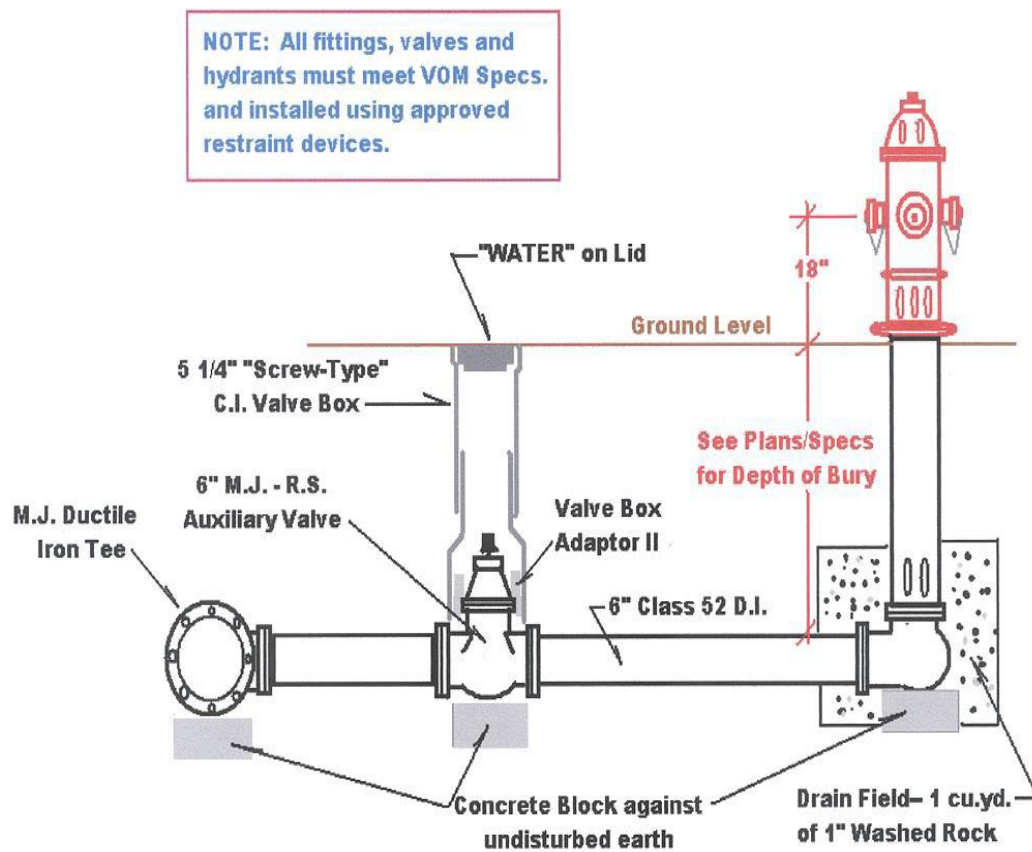
- **Waterous PACER WB-67-250**
- **Mueller Super Centurian 200 A425**

- 2) Each hydrant shall be installed with a 6" Auxiliary Valve  
    (See Gate Valves)
- 3) Hydrant leads shall be: 6" DI (Class 52)  
    or 'Grade-Lock Adapter', if necessary.
- 4) All hydrants and auxiliary valves shall be provided with approved  
    retainer fittings and accessories. (See Retainers and Glands)

## **STANDARD SPECIFICATION FOR INSTALLATION OF FIRE HYDRANT**

Village of Morton ... Morton, Illinois

[HYDDRAW] (Revised February 2005)



## WATERMAIN FITTINGS

- 1) Watermain fittings include: tees, crosses, reducing fittings, sleeves, caps, plugs, grade-lock adapters, etc., made in the U.S.A.
- 2) All fittings shall be made of Cements lined, Ductile Iron
- 3) All fittings shall be: *Mechanical (MJ) Joint* or *Alpha Restrained Joint*
- 4) All fittings shall be provided with approved retainer fittings, and accessories (gaskets and bolts).
- 5) All ¾"-10 T-Head Bolts and Nuts shall be coated with a Fluorocarbon coating 0.0005-0.0025 thickness (AWWA C111/A21.11-00)
- 6) *Romac Alpha Restrained Joints* (couplings and valves) are acceptable on all pipe sizes and materials.

## RETAINER FITTINGS (GLANDS)

All Mechanical Joint (MJ) fittings including valves and hydrants shall have retainer glands installed using manufacturer installation specifications.

... Following are approved Retainer Glands for Ductile Iron:

- 1) **...Uni-Flange (UFR 1400-DA-x-RB-U)** -- *Ford Meter Box Co, Inc*
- 2) **...EBBA 1100 Megalug** – *EBBA Iron, Inc*
- 3) Others of the aforementioned type may be used  
*if approved* by the Village of Morton

**NOTE:** Retainer Glands of the “**Set Screw**” type (ie.Columbus Standard) are not approved for use.

... Following are approved Retainer Glands for PVC Pipe

- 1) **...Uni-Flange (UFR 1500-CA-x-RB-U)** -- *Ford Meter Box Co, Inc.*
- 2) **...Romac Grip Ring** –*Romac Industries*
- 3) **...EBBA 2100 Megaflange Adapter** – *EBBA Iron, Inc*
- 4) **... EBBA Series 2000PEC** – *EBBA Iron, Inc*

## JOINT RESTRAINT DEVICES

Joint Restraint Devices may be required on pipe joints in some situations of Watermain Construction.

### **... Following Approved for Ductile Iron and PVC – Pipe x Mechanical Joint**

- 1) ... **Uni-Flange (Series 1300-C)** for Ductile Iron and C-900 PVC  
...*Ford Meter Box Co., Inc*
- 2) ... **Uni-Flange (Series 1300-S)** for C-905 PVC  
....*Ford Meter Box Co., Inc.*
- 3) ... **Romac (Style 612)** for Ductile Iron and C-900 PVC  
....*Romac Industries, Inc.*
- 4) ... **EBBA Series 2000PEC** ...*EBBA Iron, Inc*

### **... Following Approved for Ductile Iron – Pipe Bell Joints**

- 1) ... **Uni-Flange (Series 1390-C)** ...*Ford Meter Box Co., Inc.*
- 2) ... **Romac (Style 611)** ...*Romac Industries Inc.*
- 3) ... **EBBA 1700 MEGALUG Harness** ...*EBBA Iron, Inc*
- 4) ... **EBBA 1100HD Split MEGALUG Harness** ...*EBBA Iron, Inc*

### **... Following Approved for PVC / C900 – Pipe Bell Joints**

- 1) ... **Uni-Flange (Series 1350-C)** ...*Ford Meter Box Co., Inc*
- 2) ... **Uni-Flange (Series 1390-C)** ...*Ford Meter Box Co., Inc.*
- 3) ... **Romac (Style 611)** ...*Romac Industries Inc.*
- 4) ... **Certa-Lok (Spline Style)** ...*Westlake Pipe & Fittings*
- 5) ... **EBBA 1500TD Tru-Dual** ...*EBBA Iron, Inc*
- 6) ... **EBBA 1600 MEGALUG Harness** ...*EBBA Iron, Inc*

## RESIDENTIAL HDPE SERVICE PIPE

All Residential water services installed new or replaced in the Village of Morton, must meet the following minimum specifications for piping material:

- 1) High Density Polyethylene Pipe (HDPE) is the only piping allowed for use in Residential service. Other piping material must be approved for use in writing, by the Superintendent of Public Works.
- 2) The minimum size for plastic water service shall be \*1" CTS.  
*\*(Copper Tube Size) Refer to the Illinois State Plumbing Code, Section 890.1200 for proper sizing of service piping to meet customer demand requirements*
- 3) All HDPE pipe used for water service shall be: PE 4710 Polyethylene –  
\*SDR 9 *\*(Standard Dimension Ratio)*
- 4) HDPE pipe shall be rated for a minimum of 160 psig. Shall have a minimum Hydrostatic Design Stress of 630 psig. A Hydrostatic Design Basis of 1250 psi and a Minimum Burst-Pressure of 630 psig.
- 5) All fittings used for connections shall be made of Brass (made in the USA) and be of Compression type.
- 6) HDPE tubing shall be installed with 'Internal Stainless Metallic Stiffener's

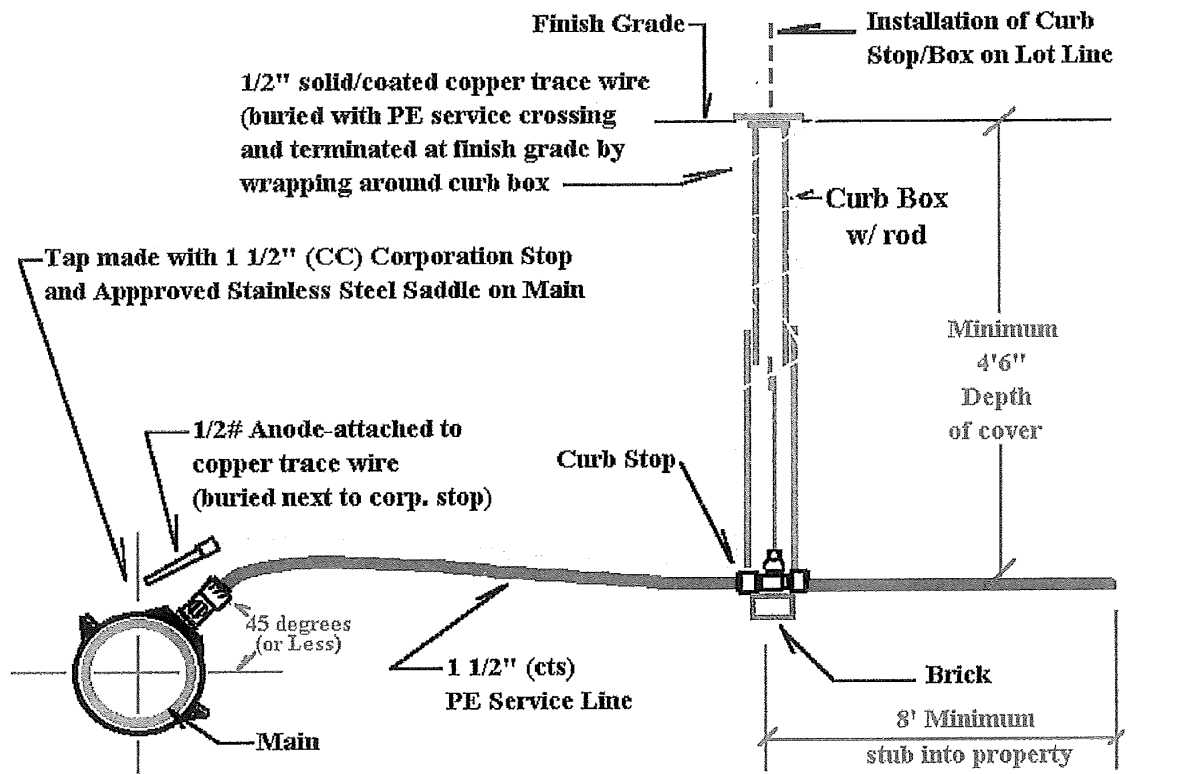
**NOTE:** 'Hose-Band Clamps' are not allowed for use.  
Compression/Flare adapters are available upon request.

## NEW SUBDIVISION: RESIDENTIAL PIPING STANDARD

To meet the water demand requirements of new larger residential homes and to insure compliance with the requirements for water service sizing as outlined in the **Illinois State Plumbing Code, Section 890.1200**, following is the standard *minimum specification* for water service materials installed in the Village of Morton Water System for New Residential Water Service (Subdivision Standard).

- 1) The minimum size for **HDPE** water service shall be **1 ½" \*CTS**  
\*(Copper Tube Size)
- 2) See Residential Service Pipe Standards Page 8 (3-6)

**Construction Note:** All service crossings shall be installed with a #12 solid/coated copper trace wire buried within 6" of the PE service pipe. It shall be terminated at the main by attaching a 1/2# anode that shall be placed at the corporation stop or by attaching the copper trace wire to the nut on the saddle. The trace wire shall be terminated at the curb stop by wrapping the trace wire around the curb box with the wire accessible at the finish grade.  
(The anode and copper wire shall be purchase at cost from the Village of Morton -- Water Distribution Dept.) **[Refer to Diagram Below]**



**NOTE: Minimum Depth of Cover is: 4 feet (09/25)**

## **BRASS FITTINGS for ALL RESIDENTAL SERVICES**

### **Service Saddle...shall be:**

- 1) Power Seal 3450AS with (Power Joint Compression)
- 2) Romac 101N or 202N with (Mueller CC Thread)

### **Corporation Stop...shall be:**

- 1) Mueller 200 Ball Corporation Valve (B-25008)
- 2) Ford Ball Corporation Valve (#FB1000-6-Q-NL)

### **Curb Stop...shall be:**

- 1) Mueller 300 Ball Curb Stop ( B-25209)
- 2) Ford Ball Curb Stop (#B44-666-Q-NL)

### **Curb Box...Shall be:**

- 1) Mueller H-10310 Box – Supplied with rod
- 2) Ford Meter EA1-45-40-18R – Supplied with rod

## COMMERCIAL SERVICE PIPE:

All Commercial water services install new or replaced, must meet the following minimum specifications for piping and materials.

**Sizes 1 ½" and 2"** ...HDPE Tubing is the only approved piping for Commercial use. (See Plastic Pipe Specifications – Below)

**Sizes 4" and Larger** ...Ductile Iron (Made in USA) is the only pipe approved for use for Commercial Service.

*Note: C900 PVC may be approved in some applications with the approval of the Director of Public Works.*

### ***...Plastic (HDPE) Water Service Specifications***

- 1) All HDPE pipe used for water service shall be: PE 4710 Polyethylene \*SDR 9 \*(*Standard Dimension Ratio*)
- 2) HDPE pipe shall be rated for a minimum of 160 psig. Shall have a minimum Hydrostatic Design Stress of 630 psig. A Hydrostatic Design Basis of 1250 psi and a Minimum Burst-Pressure of 630 psig.
- 3) All fittings used for connections shall be made of Brass (made in the USA) and be of Compression type.
- 4) HDPE tubing shall be installed with 'Internal Stainless Metallic Stiffener's.

**NOTE:** *'Hose-Band Clamps' are not allowed for use.  
Compression/Flare adapters are available upon request.*

### ***... Ductile Iron Water Service (4" and larger)***

- 1) All water main pipe used for Commercial service in sizes 4" and larger shall be: Ductile Iron with Bell and Spigot Joints, with proper gaskets.
- 2) All ductile iron used for water service shall be a minimum of:
  - ....Class 52 for 4" thru 6"
  - ....Class 50 for 8" and larger
- 3) All fittings used to make connection to the Village owned curb stop (valve) will be Ductile Iron Mechanical Joint with approved Retainer Fittings.



# **DI WATER MAIN INSTALLATION**

## **STANDARDS**

**Village of Morton, Morton, Illinois**  
(Revised September 2025 - CD, LKB)

## **TABLE OF CONTENTS**

|                                            |        |
|--------------------------------------------|--------|
| GENERAL: Illinois and AWWA Standards ..... | Page 2 |
| DEPTH OF COVER.....                        | Page 2 |
| JOINT RESTRAINT.....                       | Page 3 |
| Thrust Restraint Chart .....               | Page 3 |
| LEAKAGE AND PRESSURE TEST .....            | Page 4 |
| DISINFECTION OF MAINS.....                 | Page 5 |
| FLUSHING AND BACTERIAL TESTING.....        | Page 6 |
| WATER MAIN INSTALLATION CHECKLIST.....     | Page 7 |

## **I. GENERAL**

The Village of Morton has adopted the following standards for installation of water main and related appurtenances.

- **STANDARD SPECIFICATIONS FOR WATER AND SEWER MAIN CONSTRUCTION IN ILLINOIS - EIGHTH EDITION 2020**
- **AWWA STANDARD FOR INSTALLATION OF DUCTILE-IRON WATER MAINS AND THEIR APPURTENANCES (AWWA C600-23)**
- **AWWA STANDARD FOR DISINFECTING WATER MAINS (AWWA-651-23)**

Exceptions and/or additions to the above standards are covered in sections that follow this section.

## **II. DEPTH OF COVER**

Minimum Depth of Cover shall be 4 feet, unless stated otherwise on Water Permit or Job Specifications.

### III. JOINT RESTRAINT

- The Village of Morton requires that all mechanical joint fittings (valves, hydrants, tees, bends, etc.) must be installed using **approved retainer fittings**.
- In addition, the Village of Morton requires that an additional length of pipe must be restrained on each side of bends or vertical offsets, branch outlets of tees, before reducers, and before dead-ends (valves or hydrants). In addition to retaining the fittings themselves, any pipe that contains joints (bell and spigot, bolted couplings) that fall within these lengths must be restrained.
- These restrained lengths of pipe vary according to the parameters of the job... pipe size and type, test pressures, depth of bury, soil conditions, and trench preparation. Following is a Thrust Restraint Chart that shows these Recommended Restraint Lengths based upon parameters that are most common in the Village of Morton:

#### **THRUST RESTRAINT CHART**

Recommended Restrained Lengths

| Nom. Pipe Size (in.) | 90 degree Elbow | 45 degree Bend | 22.5 degree Bend | 11.25 degree Bend | Size/Size Tee | Valve, Hydrant, or Dead-End |
|----------------------|-----------------|----------------|------------------|-------------------|---------------|-----------------------------|
| 4 in.                | 16 ft.          | 7 ft.          | 3 ft.            | 2 ft.             | 12 ft.        | 12 ft.                      |
| 6 in.                | 23 ft.          | 10 ft.         | 5 ft.            | 3 ft.             | 18 ft.        | 18 ft.                      |
| 8 in.                | 30 ft.          | 12 ft.         | 6 ft.            | 3 ft.             | 23 ft.        | 23 ft.                      |
| 10 in.               | 36 ft.          | 15 ft.         | 7 ft.            | 4 ft.             | 28 ft.        | 28 ft.                      |
| 12 in.               | 43 ft.          | 18 ft.         | 9 ft.            | 4 ft.             | 33 ft.        | 33 ft.                      |

**Recommended** restrained length for tees are for the branch outlet and assume a minimum attached length of pipe of **10 ft.** on each side of the run.

***Thrust Restraint Chart based upon Parameters shown below  
and by use of DIPRA Thrust Restraint Calculator.  
Other parameters can be run on this program.***

| <b>Class 52 Ductile Iron Pipe</b> |             |
|-----------------------------------|-------------|
| Soil                              | CL (Normal) |
| Ave. Depth of Bury                | 4 ft.       |
| Trench Type                       | Type 3      |
| Test Pressure                     | 100 PSI     |
| Safety Factor                     | 2 : 1       |

#### IV. LEAKAGE / PRESSURE TEST

- Leakage and Pressure Testing must be performed before water samples are taken to a certified lab for bacteriological analysis.
- **Pressure Testing** will be performed at a minimum Test Pressure of 100 psi (with no variation of plus or minus 5 psi) for a duration of at least one (1) hour. Any defective pipe, fittings, services, hydrants or other appurtenances shall be replaced, and the test repeated until satisfactory to the Engineer.
- After the completion of the pressure test, a **Leakage Test** will be performed using a minimum Test Pressure of 100 psi for a duration of one (1) hour with No leakage allowed greater than shown on the chart below.

#### Allowable Leakage at 100 psi Test Pressure

| Nominal Pipe Diameter                                        | 4 in. | 6 in. | 8 in. | 10 in. | 12 in. |
|--------------------------------------------------------------|-------|-------|-------|--------|--------|
| <i>Allowable Leakage<br/>Per 100- ft. of Pipeline in GPH</i> | 0.30  | 0.45  | 0.60  | 0.75   | 0.90   |

***Ordinance 02-35 amending Title 8 Chapter 4 and Title 11 Chapter 5 of the Morton Municipal Code RE Hydrostatic Pressure Testing in New Subdivisions is as follows:***

“For new mains, all Hydrostatic pressure and leakage testing (including filling, flushing and disinfection testing) shall be performed by the Village of Morton Water Department with the cost to be paid by the developer or contractor.”

“The fee for one set of tests shall be set by the Director of Public Works and is due before the work is to be done. If the system fails to pass any of the tests, retesting shall be done at an additional time and material cost, which is also the responsibility of the developer or contractor.

## V. DISINFECTION OF WATER MAINS

- As per Illinois Standard 41-2.14B:  
"Before being placed into service, all new mains.....shall be chlorinated so that the initial chlorine residual is not less than 50 mg/l and that a chlorine residual of not less than twenty-five (25 mg/l) remains in the water after standing twenty-four (24) hours in the pipe."
- This can be done by Liquid Chlorine or Other Chlorine-Bearing Compounds. The easiest method, however, is with **Tablet Disinfection** during the installation of new pipe. Tablet Disinfection is best suited to short extensions (up to 2500 ft.) and small diameters (up to 12 in.). Because preliminary flushing is not possible with this method, cleanliness is of the utmost importance and it shall not be used if trench water or foreign material has entered the main.
- Tablets should be placed in the top half of each section of pipe and attached by use of EMI 5005 adhesive, or 100% Silicone adhesive.
- All adhesives shall meet specifications, ASTM C920 Type S NS class 25, TT-S-00230C, TT-S-01543A, MIL-A-46106A, FDA 21 CFR 177.2600, UL-File No. E163851 / E224060, and USDA Approved.
- Use the following chart to determine the number of tablets required for each length of 20' pipe to achieve 50 MG/L Dosage using 5-grain tablets of Hypochlorite (HTH).

| Nominal Pipe Size in Inches                                                      | 4 in. | 6 in. | 8 in. | 10 in. | 12 in. |
|----------------------------------------------------------------------------------|-------|-------|-------|--------|--------|
| <i>No. of 5-grain Hypochlorite Tablets (HTH) Required per 20' Length of Pipe</i> | 2     | 3     | 4     | 7      | 10     |

- Filling the main with water should be done slowly, so that the water velocity shall be less than one (1) foot per second.
- Treated water shall be retained for at least **twenty-four (24)** hours. After this period, the chlorine residual shall be at least twenty-five (25) mg/l.
- All valves connected to the existing system, shall remain in the closed position. during the disinfection process to ensure that the strongly chlorinated water does not flow back into the water supply. All other valves within the new system (line valves, hydrant valves) should be operated and remain open during the disinfection process.

## VI. FLUSHING AND BACTERIAL TESTING

- All water mains shall be satisfactorily disinfected prior to use. In accordance with the requirements of AWWA 651-99, at least one set of samples shall be collected from every 1,200 feet of new water main, plus one set from the end of the line and at least one set from each branch. Satisfactory disinfection shall be demonstrated in accordance with the requirements of **35 III. Adm. Code 625.203**.
- After pressure/leakage testing and disinfection of water mains, all chlorine treated water shall be flushed from the system a minimum of Two volumes and to a point where the chlorine residual is **no more than** 4.00 mg/l and **not less than** 1.00 mg/l
- Flushing should be accomplished by use of a hydrant meter so that "unaccounted" water can be calculated.
- Sampling must be taken by a Certified Operator from the Village of Morton.
- Sampling is best done from a service tap with a copper tubing outlet.
- Two consecutive samples will be taken to a Certified Lab for bacteriological testing and must be shown to be free of bacterial contamination before being placed into service.
- Should any sample not pass, chlorination procedure for disinfection shall be repeated until satisfactory results are obtained on successive samples taken at least 24 hours apart.

## **VII. WATER MAIN INSTALLATION CHECKLIST**

1. Must have a Construction Permit from the Illinois E.P.A.
2. Main is installed with correct amount of HTH tablets per length of pipe.
3. Introduce water slowly into the new system.
4. Shutoff valve connected to existing system.
5. Make sure all other new line valves and hydrant valves are open.
6. Disinfection must remain at least 24 hours.
7. Pressure Test -- 100 psi for 1 hour (min.). (Repair defects and Re-Test)
8. Leakage Test -- 100 psi for 1 hour (min.).
9. Open valve to system with hydrant open at end of project.
10. Flush main with hydrant meter.
11. Leave valve (connected to system) in open position.
12. Collect required number of samples and take to Certified Lab for testing
13. Before operation of new system, must have Operating Permit or partial Operating Permit from the Illinois E.P.A.
14. Open all valves into the existing system.



# **HDPE WATER MAIN INSTALLATION STANDARDS**

## **Village of Morton, Morton, Illinois**

(Revised – August 2025 – CD, LKB)

|       |                                               |          |
|-------|-----------------------------------------------|----------|
| I.    | GENERAL.....                                  | Page 2   |
| II.   | APPROVED WATER MAIN PIPE.....                 | Page 2   |
| III.  | APPROVED PIPE MANUFACTURERS.....              | Page 3   |
|       | Testing and Shipping.....                     | Page 3   |
| IV.   | APPROVED JOINING METHODS FOR HDPE PIPE.....   | Page 4   |
| V.    | BUTT HEAT FUSION JOINING PROCEDURE.....       | Page 4   |
|       | General and Set-Up Parameters.....            | Page 4   |
|       | BUTT FUSION PROCEDURE.....                    | Page 5-6 |
|       | Table 1 -Approximate Melt Bead Size.....      | Page 5   |
|       | Cold Weather Fusion Recommendations.....      | Page 6   |
| VI.   | CONTRACTOR QUALIFICATIONS.....                | Page 7   |
| VII.  | GENERAL GUIDELINES FOR ELECTROFUSION.....     | Page 8   |
|       | STEPS OF TYPICAL ELECTROFUSION PROCEDURE..... | Page 9   |
| VIII. | JOINING WITH MECHANICAL JOINT (MJ)            |          |
|       | DUCTILE IRON FITTINGS AND MJ ADAPTER.....     | Page 10  |

# **HDPE WATER MAIN INSTALLATION STANDARDS**

## **Village of Morton, Morton, Illinois**

(Revised – August 2025 – CD, LKB)

### **I. GENERAL**

HDPE may be used for water main in the Village of Morton in special situations, such as, loops, large services, boring applications and subdivision rehabilitation or any situation where the use of Ductile Iron would be impracticable.

The use of HDPE as water main, may only be used if approved by the Superintendent of Public Works and installed using approved methods.

The following standards for water main installation are still applicable.

- **STANDARD SPECIFICATIONS FOR WATER AND SEWER MAIN CONSTRUCTION IN ILLINOIS - EIGHTH EDITION 2020**
- **AWWA STANDARD FOR INSTALLATION OF HIGH-DENSITY (HDPE) WATER MAINS AND THEIR APPURTENANCES (AWWA C906-21) (AWWA M55 Manual-Second Edition)**
- **VILLAGE OF MORTON WATER MAIN INSTALLATION STANDARDS**
- **ALL APPLICABLE PIPE MANUFACTURER JOINING PROCEDURES.**

Exceptions and/or additions to the above standards are covered in sections that follow in this section.

### **II. APPROVED HDPE WATER MAIN PIPE**

All HDPE pipe approved for use as water main shall be:

- PE4710 – SDR 11.0
- 4 in. thru 8 in. ... IPS (Iron Pipe Size)
- 10 in. and larger ... IPS or DIPS (Ductile Iron Pipe Size) as approved by design and the Superintendent of Public Works
- 160 PSI Pressure Rating (Long term Hydrostatic Basis of 1600 psi)
- 40 - 50 ft. sticks (Coiled pipe not allowed for 8" or larger HDPE)

### III. **APPROVED PIPE MANUFACTURERS**

Following are approved pipe manufacturers for HDPE water main pipe:

**WL Plastics**

*Corporate Office:*  
3575 Lone Star Circle, Suite 300  
Fort Worth, TX. 76177  
682-831-2700  
[www.wlpastics.com](http://www.wlpastics.com)

**The Performance Pipe**

*General Office:*  
PO Box 269006  
Plano, TX 75026-9006  
1(800) 527-0662  
[www.performancepipe.com](http://www.performancepipe.com)

**GF Central Plastics**

*General Office:*  
9271 Jeronimo Rd.  
Irvine, CA. 92618  
714-731-8800  
[www.gfps.com](http://www.gfps.com)

**JM Eagle**

*General Office:*  
5200 West Century Blvd  
Los Angeles, CA  
1(800) 621-4404  
[www.jmeagle.com](http://www.jmeagle.com)

### **TESTING:**

If requested, the supplier shall furnish the following:

- 1) Information and specifications as to its resistance to chemicals and Environmental Stress Crack Resistance.
- 2) Property values, such as density, melt index, tensile yield, etc. as well as the ASTM test methods used to arrive at those values.
- 3) Recommended Fusion Procedures and Fusion Qualification Test Procedures.

### **SHIPPING:**

Care should be exercised during the transportation of Polyethylene pipe/tubing to protect against scratching, gouging, or abrasions of the pipe. Upon delivery, any pipe inspected and found to be less than satisfactory in marking and/or handling will be rejected and refused without unloading.

- All Polyethylene pipe/tubing in coils form, shall be shipped with plastic end caps.
- All Polyethylene pipe/tubing in straight length form, shall be shipped by tarping the leading ends of all stacks on the truck.

## IV. APPROVED JOINING METHODS FOR HDPE

HDPE pipe used for water main may only be joined by use of one of the following approved methods:

- 1. BUTT Heat Fusion**
- 2. Electro-Fusion**
- 3. Ductile Iron Mechanical Joint Fittings w/HDPE MJ Adapter**

## V. BUTT HEAT FUSION JOINING PROCEDURE

### General

In heat fusion joining, mating surfaces are prepared by cleaning, and facing, simultaneously melted with a hot-plate heater, the heater is removed, and the melted surfaces are pressed together and held under pressure. as the molten materials cool, they mix and fuse into a permanent, monolithic joint.

### Set-Up Parameters

#### HEATING TOOL SURFACE TEMPERATURE --

***Minimum 425 degree F -- Maximum 450 degree F (204 -- 243C)***

- Heating tool surfaces must be up to the specified temperature before you begin.
- All points on both heating tool surfaces where surfaces will contact the pipe must be within the prescribed minimum and maximum temperatures.
- *Temperatures must be checked with a calibrated Pyrometer*
- Heating tool surfaces must be clean. *(Always wipe tool surfaces with a clean cotton cloth before heating pipe faces)*

#### INTERFACE PRESSURE -- ***Minimum 60 psi -- Maximum 90 psi***

Interface pressure is used to calculate a fusion joining pressure value for hydraulic butt fusion machines or manual machines equipped with a torque wrench. (Hydraulic machines such as, McElroy 28, TracStar series, 412, etc. must be used to Butt fuse 6" and larger HDPE pipe.) For hydraulic machines, the interface pressure, the fusion surface area, the machine's carriage cylinder size and internal drag pressure, and if necessary, the pressure needed to overcome external drag resistance, are used to calculate hydraulic fusion joining pressure gauge settings. The equipment manufacturer's instructions are used to calculate this value.

***Interface pressure and fusion machine hydraulic fusion joining pressure gauge settings are not the same.***

## **Butt Fusion Procedure**

- **Secure.** Clean the inside and outside of the component (pipe or fitting) ends by wiping with a clean, dry, lint-free cloth or paper towel. Align the component ends in the machine. ***Do not force pipes into alignment against open fusion machine clamps.*** Component ends should protrude past the clamps enough so that facing will be complete. Bring the ends together and check high-low alignment. Adjust alignment as necessary by tightening the high side down. Make sure clamps are properly secured to prevent slippage of the component ends.
- **Face.** Place the facing tool (*with sharp, clean blades*) between the component ends, and face them to establish smooth, clean, parallel mating surface. If stops are present, face down to the stops. Remove all shavings from pipe ends after facing (*Check for shavings inside pipe walls*) ***Do not touch the component ends with your hands after facing***, oils from your hands can contaminate the facing surface.
- **Align.** Bring the component ends together, check alignment and check for slippage against fusion pressure. Look for complete contact all around both ends with no detectable gaps, and outside diameters in high-low alignment. ***If high-low is above plus or minus 10 percent of pipe wall thickness, adjust high side down, and always re-face pipe ends and inspect afterwards.***
- **Melt.** Verify that the heating tool is maintaining the correct temperature. (*Temperatures must be checked with a calibrated Pyrometer*) Place the heating tool between the component ends and move the ends against the heating tool. The initial contact should be under moderate pressure to ensure full contact. Hold the ends against the heating tool ***without force***.

Beads (*melt swell*) of melted polyethylene will form against the heating tool at the component ends. When the proper melt bead size is formed, quickly separate the ends, and remove the heating tool.

| Table 1 ... Approximate Melt Bead (Swell) Size |                                    |
|------------------------------------------------|------------------------------------|
| Pipe Size                                      | Approximate Melt Bead (Swell) Size |
| 2" to 4"                                       | 1/8" to 3/16"                      |
| 6" to 12"                                      | 3/16" to 1/4"                      |
| 12" -- 24"                                     | 1/4" to 7/16"                      |

- **Join.** Immediately after heating tool removal, **QUICKLY** inspect the melted ends, then bring the ends together applying the correct joining force, using 60-90 psi interfacial pressure. **DO NOT SLAM.** The correct joining force will form a double bead that is rolled over to the surface on both ends.
  
- **Hold.** Hold joining force against the ends until the joint is cool. The joint is cool enough for **GENTLE** handling when the bead is cool to the touch. Cool for about 30-90 seconds per inch of pipe diameter. (Cooling time should be adjusted according to ambient outside temperature and weather conditions.)  

**Heavier wall thickness pipe will require longer cooling times.**  
**Complete cooling of joint should occur before ROUGH handling of pipe, such as lifting with machinery, installing in trench and Pressure Testing.**
  
- **Inspect.** On both sides, the double bead should be rolled over to the surface, and be uniformly rounded and consistent in size all around the pipe. (Comparison should be made to examples of proper joints as found in the Pipe Manufacture's Qualification Guide.)  

**If a joint fails the visual inspection, it must be cut out.**  
**Reference Material: Performance Pipe Bulletin PP 750-TN-05**
  
- **Cold Weather Fusion Recommendations (Below 55 degrees F)**
  - Keep pipe and fittings clear of ice, snow, dirt, and other contaminants.
  - Shield areas to be fused with wind break or cover.
  - In cold weather, pipe diameters and socket fittings will normally contract. Keep fittings in cab of truck to reduce exposure.
  - To obtain proper melt patterns: **Increase Melt Time Cycles. DO NOT** Increase temperature or Pressure of Pipe and/or Fittings on Heating Tool Faces.
  - Trial melt patterns on pipe and fittings under field conditions may have to be done to establish proper melt patterns.
  - On butt fusion, the time required to obtain initial Melt Swell Bead will automatically extend the total time cycle.
  - Consider using Electro-fusion for cold weather repairs and saddle installation.
  - When in doubt about weather affecting the fusion joint; postpone the fusion, if possible, to a better day.

## VI. CONTRACTOR QUALIFICATION

Any contractor installing HDPE for use as water main in the Village of Morton, must be qualified by training and testing to make approved joints with HDPE water pipe.

### 1) *Training.*

- All contractor personnel used as fusion joining technicians, must meet with Village of Morton (VOM) employees and discuss the requirements and procedures of HDPE installation within the Village of Morton.
- All personnel employed by an engineering firms used as inspectors of the water main project, must also attend the VOM training program on HDPE installation.

### 2) *Inspection of Fusion Equipment.*

- All equipment used to make a HDPE fusion joint, must be inspected and approved for use by the Superintendent of the Village of Morton Water Distribution Department.
- The Superintendent will determine that the equipment has been properly maintained and is in good condition for use and will verify that the equipment provided has the proper heating tool, facers and adapters.
- The Electrofusion Processor (Control Box) must be calibrated annually.

### 3) *Testing.*

- All contractor personnel used as fusion joining technicians, must make a total of (3) fusion joints, that will be cut out and visually and destructively tested. The joints must be made and tested by using the following procedure.
  - a) All joints made for testing must be made with the same equipment approved for use during the water main project. (See VI (2) above.)
  - b) All joints made for testing must be made under the same ambient weather conditions that the HDPE will be installed during the project.
  - c) The contractor employee will use the pipe manufacturers' current approved procedures for making the fusion joint.
  - d) The contractor employee will use the fusion equipment manufacturer's procedure and guidelines for making the fusion joint.
  - e) An employee from the Village of Morton Water Distribution must be present to witness all joints made for testing.
  - f) All joints made for testing must be visually inspected and found to have the same appearance as the photographs of a joint that is acceptable under the pipe manufacturer's "Recommended Joining Procedures" and Guide Material.
  - g) Cut 2-3 straps from each joint that are 1 in. wide and 12 inches in length with the fusion bead being in the middle of the strap. Visually examine each strap for voids or discontinuities on the cut surface of the strap.
  - h) Deform each sample strap by bending (refer to manufacturer's guideline material). **No failure** can initiate in the fusion **joint area**.

## VII. GENERAL GUIDELINES FOR ELECTROFUSION

### 1) Material Compatibility:

Electro-fusion Fittings must be produced from a pre-blended virgin resin that has a **PPI listing of PE4710** and have been qualified and manufactured in compliance with **ASTM D3350**. This resin must carry a **NSF/ANSI Standard 61-2024** listing for use with potable water. The fittings must be tested to the requirements of AWWA C906. All electro-fusion fittings must be **pressure rated to 160 PSI**.

### 2) Environmental Conditions:

The temperature limits are **-20 F to 122 F**.

- When fusing below (0) F, special care must be exercised, and portable heating of the immediate work area is recommended.
- On warm sunny days, the pipe and fitting surface should be checked with a pyrometer to ensure the surface does not exceed (122) F. Portable shades may be required.
- Humidity is not a factor with Electro-fusion; however the pipe and fittings must be kept dry. Additional wiping with an alcohol prep. may be necessary.

### 3) Out-Of-Round:

- For Straight Pipe: Cannot be out-of-round by more than **2%**.

4) When installing couplings, ensure the water flow is completely shutoff. Any water will contaminate the joint.

5) Do not disturb the cables or the fitting; or remove the clamps until the required post-fusion cooling times. (Refer to manufacturer's literature and guidelines)

6) Actual heating times may vary, depending upon conditions, however, they may not vary greater than +/- 25% of the stated heating times published in manufacturer's literature or on the Fitting Barcode.

## 7) STEPS OF TYPICAL ELECTROFUSION PROCEDURE:

A) Cut pipe ends square.

B) Mark proper insertion depth on both ends of the pipe.  
(Pipe should butt together at the center of the coupling)

C) Using the appropriate tools, scrape off surface oxidation of all the areas of the pipe to be fused. Remark pipe, if necessary. Scraping should reduce the average outside diameter of the pipe by the amounts indicated below:

| <b><u>PIPE SIZE</u></b> | <b><u>REDUCTION IN PIPE O.D.</u></b> |
|-------------------------|--------------------------------------|
| 1 1/4"IPS and smaller   | 004 - .012"                          |
| 2"IPS and larger        | .008 - .024"                         |

D) Remove all shavings from pipe. Scraped pipe and adjoining surfaces must be clean and dry.

E) Secure one end of pipe into alignment clamp so that the end of pipe is at the centerline of the clamp.

F) Remove coupling from its protective bag and clean both coupling and pipe end with approved alcohol prep.

G) Slide coupling fully onto clamped pipe end.

H) Install second pipe end into alignment clamp until it butts against first pipe, then secure with the clamp.

I) Clean the second pipe end with an approved alcohol prep.; and slide the coupling over the second pipe end centering it by use of the insertion depth marks or centering marks on the alignment clamp.

*[Improper positioning of the coupling on the pipe may result in a failed joint]*

**PERFORM THE FOLLOWING STEPS ACCORDING TO THE MANUFACTURE'S PROCEDURES DEPENDING ON TYPE OF CONTROL BOX USED AND TYPE OF FUSION PROCESS (SELF REGULATION, BARCODE OR MANUAL).**

J) Attach terminals to fitting.

K) Activate fusion cycle.

L) Remove terminals and perform visual inspection and/or verification of a completed fusion. (refer to manufacturer's literature and guidelines)

M) Allow proper cooling time before removing alignment clamps. (refer to manufacturer's literature and guidelines)

## VIII. JOINING WITH MECHANICAL JOINT (MJ) DUCTILE IRON FITTINGS AND MJ ADAPTER

- The polyethylene MJ Adapter is the perfect connection for joining HDPE water pipe to any ANSI/AWWA C153 ductile iron MJ fittings, particularly hydrant tees, in-line main valves and solid sleeve couplings. ***MJ Adapter eliminates the need for thrust blocking or retaining fittings.***

### 1) Material Compatibility:

Polyethylene MJ Adapters must be produced from a pre-blended virgin resin that has a ***PPI listing of PE4710*** and have been qualified and manufactured in compliance with ***ASTM D3350***. This resin must carry a ***NSF Standard 61*** listing for use with potable water. The fittings must be tested to the requirements of ***ANSI/AWWA C906***.

All electro-fusion fittings must be ***pressure rated to 160 PSI***.

### 2) Installation Procedure:

- a) Slide on ductile iron MJ back-up gland onto HDPE pipe end. Be sure that the lip extension of the gland is pointing toward the plain pipe end, followed by the gasket with the tapered edge of the gasket also towards the plain pipe end.
- b) Fuse on MJ Adapter to plain pipe end using Butt or Electro-fusion Procedure.
- c) After proper cooling, lubricate gasket and plain end of MJ Adapter using approved pipe lubricant meeting AWWA C111.
- d) Insert the MJ Adapter into the socket end of the ductile iron MJ fitting and press or tap the gasket firmly and evenly into the gasket recess. Keep joint straight during assembly.
- e) Push the gland toward the fitting and center it around the pipe with the gland end against the gasket. Insert the tee bolts and hand tighten nuts. (T-bolt head should be against the fitting flange) ***Note: Order MJ Adapter with accessory kit, which includes gland and longer T-bolts All T-bolts & Nuts must be Fluorocarbon coated.*** With the gland positioned and centered around the pipe, continue to tighten the T-bolts/ Set joint deflection after joint assembly but before tightening bolts. (*Max. deflection 5 degrees*)
- f) Tighten the T-bolt to the same torque recommended in AWWA C-111. (***75-90 ft-lb for 4" thru 24" sizes***) Tighten in an alternating manner (12 o'clock, 6 o'clock, 9 o'clock, 3 o'clock), maintaining the same gap between the gland and the face of the MJ fitting. Repeat the process until all bolts are within the approximate torque range. (***Use of a torque wrench is recommended***)



