

# **Water Main Standards and Material Specifications**

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

*[WATER-Specs] (Revised June 2023 - PKU)*

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

**Note:** The Village of Morton Water System consists of: Water main piping, services and any appurtenances maintained by the Village up to the outlet of the curb stop including: corporation stops, curb stops, etc.

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

Material Description, Name of the Manufacturer, and the Name of the Supplier.

- 3) Water main Materials shall include, but not limited to, the following:

Water main Pipe	Service Pipe
Water main Fittings	Bolts
Valves	Valve Boxes/Lids
Hydrants	Glands and Retainers
Corp. & Curb Stops	Curb Boxes
Gaskets	Brass Fittings
Restraint Devices	

- WATERMAIN PIPE:**
- 1) All water main pipe shall be: ***Ductile Iron with Bell and Spigot Joints*** ('Tyton' or 'Fastite'). Proper gaskets and lubrication will be provided.

- 2) Cement Lined.

- 3) All water main pipe shall be a minimum of:

- 4) All water main pipe shall be a minimum of:

...Class 50 for 8" and larger

...Class 52 for 4 and 6"

## 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: **American Flow Control Series 2500-1** are approved resilient seat gate valves.

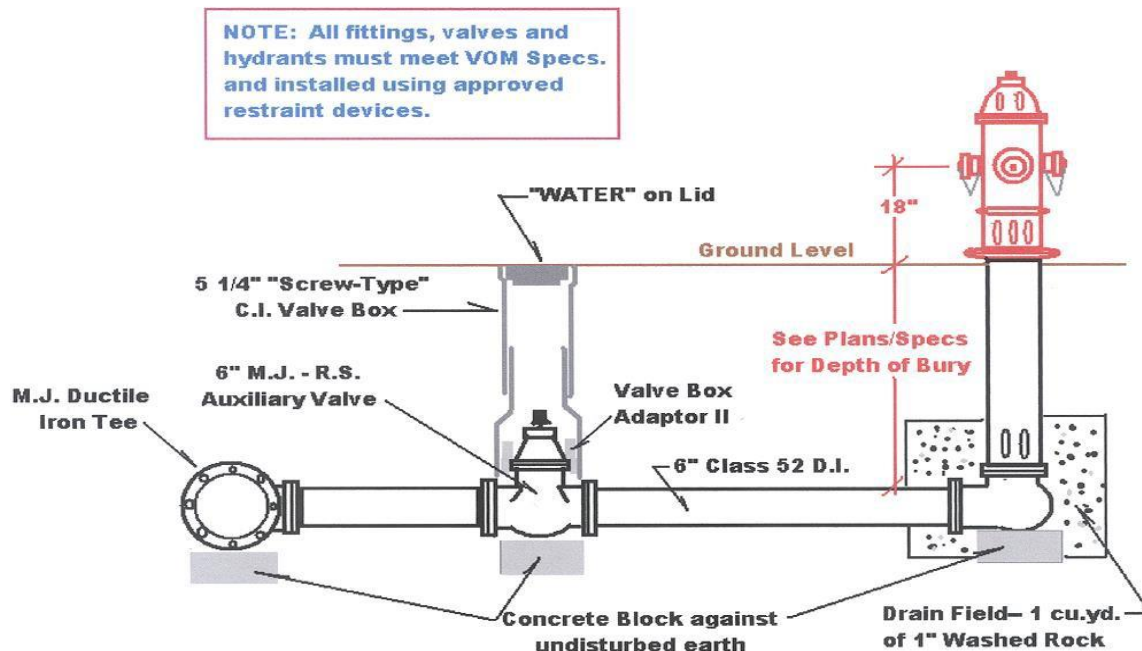
- 2) All Valves shall be provided with approved retainer fittings, gaskets and accessories. Valves with **Romac-Alpha Ends** are an acceptable joint connection.
- 3) All valves shall be supplied with 5 1/4", 'Screw-type'--Cast Iron Valve Boxes, **Tyler** and **East Jordan** brand only with Lid that has the word **"WATER"** inscribed on it.
- 4) All valve boxes shall be installed upon the valve with the use of a **Valve Box Adaptor II** as manufactured by **Adaptor Inc.**  
**2151 South 54th. Street West Allis**  
**Wisconsin, 53219, (414) 764-6733**  
or an approved equal. The Valve Box Adaptor II shall be sized for the appropriate valve application (e.g. size, make, model).

## HYDRANTS:

- 1) All new hydrants shall be:  
**3-way, 5 1/4" WB-67-250 Waterous "PACER"**  
with 6" M.J. Boot  
16" Upper  
Standpipe  
Open Left  
1 1/2" Pentagon Operating Nut,  
(2)- 2 1/2" Nozzles, (1)- 4 1/2" Nozzle  
National Standard Threads and vented  
nozzle cap
- 2) Each hydrant shall be installed with a 6" Auxiliary valve.  
(See Gate Valves)
- 3) Hydrant leads shall be: 6" DI (Class 52)
- 4) All hydrants and auxiliary valve shall be provided with approved  
retainer fittings and accessories.

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

Village of Morton ... Morton, Illinois  
[HYDDRAW] (Revised February 2005)



## **WATERMAIN FITTINGS:**

- 1) Water main Fittings include: tees, crosses, reducing fittings, sleeves caps, plugs, grade-lock adapters, etc.
- 2) All fittings shall be: made of **Cement Lined, Ductile Iron**.
- 3) All fittings shall be: **Mechanical Joint or Alpha Restrained Joint**
- 4) All fittings shall be provided with approved retainer fittings and accessories.
- 5) All 3/4-10 T-Head Bolts & Nuts shall be coated with a Fluorocarbon coating 0.0005-0.0025 thickness (AWWA C111/A21.11-00)
- 6) Romac Alpha Restrained Joints (*couplings & 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 the 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) ... 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 GripRing** -- Romac Industries, Inc.

## JOINT RESTRAINT DEVICES:

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

### ***Following are approved Joint Restraint Devices:***

#### **... 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.*

#### **... PVC / C- 905 Pipe Bell Joints...Steel pipe O.D. (IPS)**

- 1) ... ***Uni-Flange (Series 1350-S)***... *Ford Meter Box Co. , Inc.*
- 2) ... ***Uni-Flange (Series 1390-S)***... *Ford Meter Box Co., Inc.*
- 3) ... ***Romac (Style 612)*** ... *Romac Industries, Inc.*

#### **... PVC / C- 900 Pipe Bell Joints...Ductile Iron O.D.**

- 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.*

#### **... Ductile Iron - Pipe Bell Joints**

- 1) ... ***Uni-Flange (Series 1390-C)***... *Ford Meter Box Co., Inc.*
- 2) ... ***Romac (Style 611)***... *Romac Industries Inc.*
- 3) ...***Restraint Joint Gaskets***...*Tyton Field Lok, American Fast Grip*

## RESIDENTIAL SERVICE PIPE:

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

Copper and P.E. tubing are the **only** piping allowed for use in Residential service. Other piping must be approved for use, in writing, by the Supt. of Public Works.

### ***... Copper Water Service***

- 1) The minimum size for copper water service shall be: 3/4" CTS (Copper Tube Size) Type K.\*
- 2) All fittings used for connections shall be made of brass and be of the compression type.
- 3) No **flare** fittings are allowed. If during replacement of a service, a connection to an existing flare curb stop is required, a compression/flare adapter is available at no cost upon request of the Water Distribution Department located at the Public Works Garage at 450 Detroit Ave.

### ***... Plastic Water Service***

- 1) The minimum size for plastic water service shall be: 1" CTS (Copper Tube Size).\*
- 2) All plastic pipe used for water service shall be: PE 4710 Polyethylene - SDR 9
- 3) 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 psig and a Minimum Burst-Pressure of 630 psig.
- 4) All fittings used for connections shall be made of brass and be of the compression type.
- 5) P.E tubing shall be installed with 'Internal Stainless Metallic Stiffener's'.

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

(\* Refer to the Illinois State Plumbing Code, Section 890.1200 for proper sizing of service piping to meet customer demand requirements.)

## **NEW SUBDIVISION RESIDENTIAL SERVICE PIPE:**

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).

- **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]

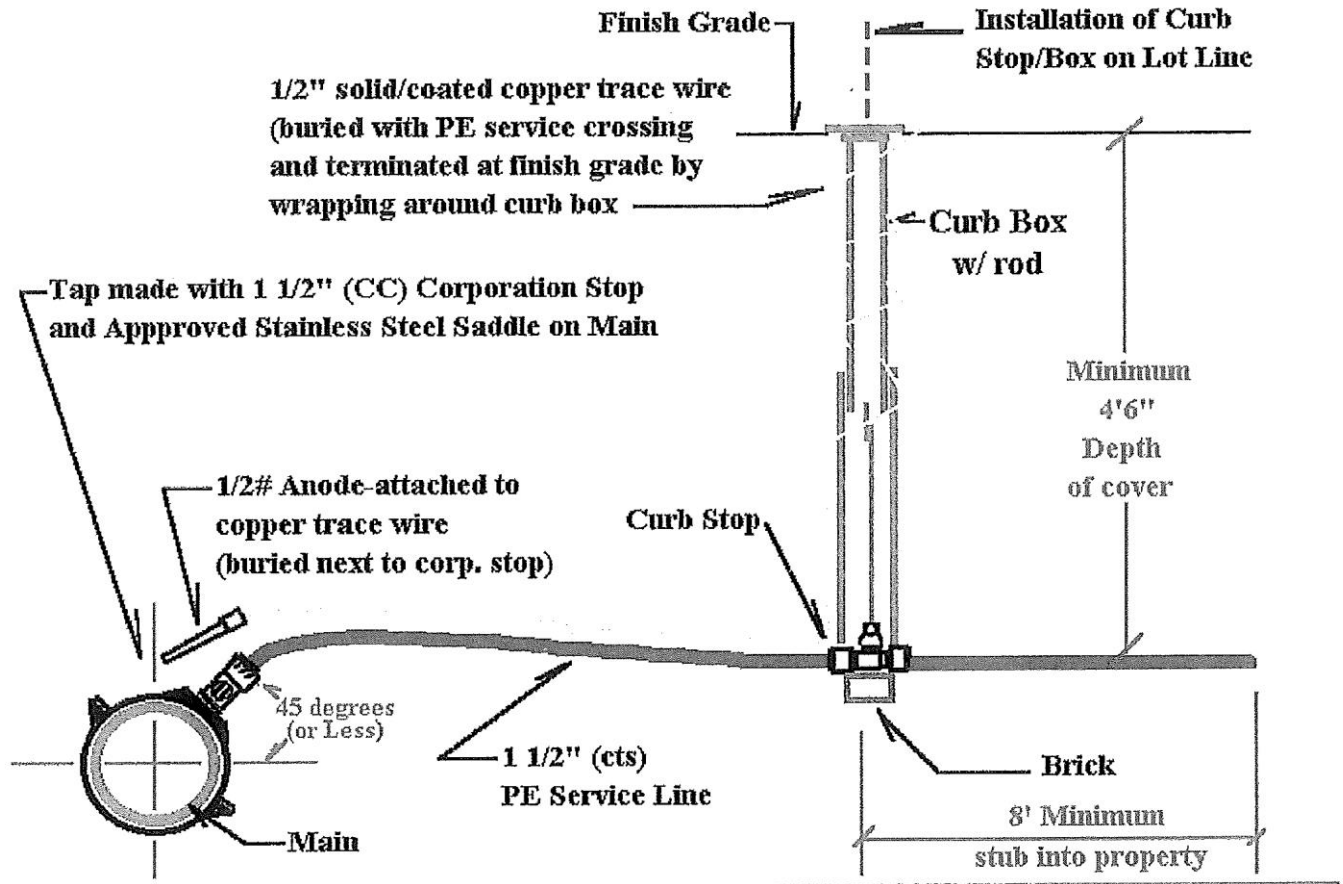
- **Service Pipe**

- 1) The minimum size for plastic water service shall be:  
**1 1/2" CTS (Copper Tube Size).**
- 2) All plastic pipe used for water service shall be:  
**PE 4710 Polyethylene - SDR 9**
- 3) 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 psig** and a  
Minimum Burst-Pressure of **630 psig**.
- 4) P.E tubing shall be installed with 'Internal Stainless Metallic Stiffners'.

- **Brass Fittings**

- **Service Saddle**... Shall be:  
*Romac 101 N or 202N with (1 1/2" Mueller CC Thread)*  
*or: Cascade Style CNS1 with (1 1/2" Mueller CC Thread)*  
*or: Ford FC101 or FC202 with (1 1/2" CC Thread)*
- **Corporation Stop**... Shall be:  
*1 1/2" Mueller 200 Ball Corporation Valve (# 1 1/2" B-25008)*  
*1 1/2" Ford Ball Corporation Valve (# FB1000-6-Q-NL)*
- **Curb Stop**... Shall be:  
*1 1/2" Mueller 300 Ball Curb Valve (#1 1/2" B-25209)*  
*1 1/2" Ford Ball Curb Stop (# B44-666-Q-NL)*
- **Curb Box**... Shall be:  
*Mueller H-10310 Box--supplied with rod*

Standard Specification for Installation of New Subdivision  
Residential Water Service  
Village of Morton - Morton, Illinois





## **COMMERCIAL SERVICE PIPE:**

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

**Sizes 1 1/2 and 2".....**Copper and P.E. tubing are the only piping approved for use in Commercial service.

**Sizes 4" and larger...**Class 52 Ductile Iron is the only piping approved for use in Commercial service. C900 PVC may be approved for use by the Director of Public Works in some applications.

The above requirements are for use in the Public R.O.W. Use of other materials not listed above, after the curb stop, must have prior approval from the Director of Public Works.

### **... Copper Water Service (1 1/2 & 2")**

- 1) Copper used for water service shall be:  
a minimum of Type K, Copper Tube Size (CTS)
- 2) Fittings used for connection to the Village owned curb stop (valve) shall be made of brass and be of the compression type.
- 3) No **flare** fittings are allowed.

### **... Plastic Water Service (1 1/2 & 2")**

- 1) All plastic used for water service shall be:  
PE 4710 Polyethylene - SDR 9, Copper Tube Size (CTS)
- 2) 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 psig and a  
Minimum Burst-Pressure of 630 psig.
- 3) Fittings used for connection to the Village curb stop (valve) shall be made of brass and be of the compression type.
- 4) P.E. tubing shall be installed with "Internal Stainless Metallic Stiffners".

**NOTE:** Flare fittings or 'Hose/Band Clamps' are not allowed for use.

**... *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.

## **BRASS FITTINGS:**

All brass fittings that are used in connections to the Village owned curb stop must be of compression type.

Following is a listing of approved brass fittings that shall be used if incorporated into the Village of Morton Water System.

### **Residential Service (New Installation)**

#### **... Corporation Stops**

- 1) ... **Mueller B-25008 '300' Ball \***
- 2) ... **Ford FB 1000-Q-NL \***

*\* Inlet-- AWWA taper ( "CC") thread*

*Outlet-- Mueller 110 Conductive Compression Connection  
or Ford Quick Joint Compression Connection*

#### **... Curb Stops (Valve)**

- 1) ... **Mueller B-25209 '300' Ball \***
- 2) ... **Ford Ball Curb Stop \***

*\* Mueller 110 Conductive Compression Connection*

*\* Ford Quick Joint Compression Connection*

#### **... Service Saddle**

If tapping of main is conducted with use of a saddle\*,  
the following saddle shall be used:

##### **(For Ductile Iron, Cast Iron, Asbestos Cement)**

- ... **Romac Style 101N** (CC thread, stainless)
- ... **Cascade Style CNS1** (CC thread, stainless)
- ... **Ford FC101** (CC thread, stainless)

##### **(For PVC Pipe)**

- ... **Romac Style 304** (CC thread, stainless)
- ... **Ford FS313** (CC thread, stainless)

*\* An approved saddle must be used on any tap of  
1 1/4" or larger.*

## **Larger Water Service - (1 1/2 & 2") (New Installation)**

### **... Corporation Stops**

- 1) ... **Mueller B-25008 'Ball' Corp\***
- 2) ... **Ford FB1000-Q-NL 'Ball' Corp\***

\* Inlet-- AWWA taper ("CC") thread  
Outlet-- Mueller 110 Conductive Compression Connection  
or Ford Quick Joint Compression Connection

- 3) ... **Mueller B-20045 'Ball' Corp\*\***
- 4) ... **Ford FB1600-NL 'Ball' Corp\*\***

\*\* Inlet-- AWWA taper (Mueller "CC") thread  
Outlet-- F.I.P. thread (Must use: Mueller H-15428  
or Ford C84-Q-NL Straight Coupling - 110 x  
M.I.P. thread - on outlet)

### **... Curb Stops (Valve)**

- 1) ... **Mueller B-25209 'Ball'\***
- 2) ... **Ford B44-Q-NL 'Ball'\***

\* Mueller 110 Conductive Compression Connection  
\* Ford Quick Joint Compression Connection

### **... Service Saddle**

If tapping of main is conducted with use of a saddle,  
the following saddles shall be used:

#### **(For Ductile Iron, Cast Iron, Asbestos Cement)**

- 1) ... **Romac Style 202 N** (CC thread, double strap)
- 2) ... **Ford FC 202** (CC thread, double strap)
- 3) ... **Mueller BR 2 S Series** (CC thread, double strap,  
bronze/stainless)

#### **(For PVC pipe)**

- 1) ... **Romac Style 305** (CC thread, stainless)
- 2) ... **Ford FS 323** (CC thread, stainless)

**VILLAGE OF MORTON**  
**WATER MAIN INSTALLATION STANDARDS**  
**Village of Morton, Morton, Illinois**  
***(Revised – February 2018 -- PKU)***

**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 - SEVENTH EDITION 2014**
- **AWWA STANDARD FOR INSTALLATION OF DUCTILE-IRON WATER MAINS AND THEIR APPURTENANCES (ANSI-AWWA C600-82)**

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

**II. DEPTH OF COVER TRACE WIRE**

Minimum Depth of Cover shall be 4 feet 6 inches, unless stated otherwise on Water Permit or Job Specifications. All Water Main shall have #12 Solid/Coated Copper Trace wire, which shall be Terminated at Finish Grade level at all In-Line and Branch Valve Box locations.

### 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 X Size Tee*	Valve, Hydrant, or Dead-End
4 in.	9 ft.	4 ft.	2 ft.	1 ft.	7 ft.	13 ft.
6 in.	13 ft.	6 ft.	3 ft.	2 ft.	12 ft.	18 ft.
<b>8 in.</b>	<b>16 ft.</b>	<b>7 ft.</b>	<b>4 ft.</b>	<b>2 ft.</b>	<b>18 ft.</b>	<b>24 ft.</b>
10 in.	20 ft.	9 ft.	4 ft.	2 ft.	23 ft.	28 ft.
12 in.	23 ft.	10 ft.	5 ft.	3 ft.	28 ft.	34 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 Uni-Flange Thrust Restraint Software.  
Other parameters can be run on this program.*

<i>Pipe</i>	<i>Class 5 Ductile Iron Pipe</i>
Soil	CL (Normal)
Avg. Depth of Bury	4.5 ft.
Trench Type	Type 3
Test Pressure	100 PSI
Safety Factor	2 : 1

#### IV. LEAKAGE / PRESSURE TEST

- Leakage and Pressure Testing should be performed before water samples are taken to a certified lab for bacteriological analysis.
- **Pressure Testing** will be performed at a minimum 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 Per 100- ft. of Pipeline in GPH</i>	<i>0.30</i>	<i>0.45</i>	<i>0.60</i>	<i>0.75</i>	<i>0.90</i>

***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.

# **HDPE WATER MAIN INSTALLATION STANDARDS**

**Village of Morton, Morton, Illinois**  
***(Revised – March 2018 -- PKU)***

## **I. GENERAL**

HDPE may be used for water main in the Village of Morton only 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 Water Distribution 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 - SEVENTH EDITION 2014**
- **AWWA STANDARD FOR INSTALLATION OF DUCTILE-IRON WATER MAINS AND THEIR APPURTENANCES (ANSI-AWWA C600-82)**
- **VILLAGE OF MORTON WATER MAIN INSTALLATION STANDARDS**  
***(Revised – March 2018-- PKU)***
- **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:

- 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 Water Distribution
- SDR 11.0
- 160 PSI Pressure Rating
- 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

#### **The Performance Pipe**

General Office:  
PO Box 269006  
Plano, TX 75026-9006  
1(800) 527-0662

#### **GF Fischer Plastics**

General Office:  
9271 Jeronimo Rd.  
Irvine, CA. 92618  
714-731-8800

#### **JM Eagle**

General Office:  
5200 West Century Blvd  
Los Angeles, CA  
1(800) 621-4404

### **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 28, 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**

1. **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.
2. **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, also.*) ***Do not touch the component ends with your hands after facing.***
3. **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.***
4. **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	
<i>Pipe Size</i>	<i>Approximate Melt Bead (Swell) Size</i>
2" to 4"	1/8" to 3/16"
6" to 12"	3/16" to 1/4"
12" -- 24"	1/4" to 7/16"

5. **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.

**6. 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.**

**7. 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 Manufacturer's Qualification Guide.)

→ **If a joint fails the visual inspection, it must be cut out.**

**Reference Material: Performance Pipe Bulletin PP 750-TN-05**

## **8. Cold Weather Fusion Recommendations (Below 55 degrees F)**

a) Keep pipe and fittings clear of ice, snow, dirt, and other contaminants.

b) Shield areas to be fused with wind break or cover.

c) In cold weather, pipe diameters and socket fittings will normally contract. Keep fittings in cab of truck to reduce exposure.

d) To obtain proper melt patterns: **Increase Melt Time Cycles. DO NOT** Increase temperature or Pressure of Pipe and/or Fittings on Heating Tool Faces

e) Trial melt patterns on pipe and fittings under field conditions may have to be done to establish proper melt patterns.

f) On butt fusion, the time required to obtain initial Melt Swell Bead will automatically extend the total time cycle.

g) Consider using Electro-fusion for cold weather repairs and saddle installation.

h) 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 an employee of the Village of Morton Water Distribution Department.
- The VOM employee will determine that the equipment has been properly maintained and is in good condition for use. The VOM employee will verify that the equipment provided has the proper heating tool, facers and adapters.

### 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 Standard 61** 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 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 in within 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 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***)

