

ISSUE DATE JANUARY 1ST, 2008

# SECTION 2

# QUALITY ASSURANCE



**GENERAL:**

THE ENGINEER OF RECORD OR HIS/HER REPRESENTATIVE SHALL WITNESS ALL TESTING, INCLUDING, BUT NOT LIMITED TO:

1. PRESSURE TESTING OF WATER, RE-USE, AND SEWER FORCE MAINS INCLUDING THE INSTALLATION OF TAPPING SLEEVES.
2. AIR TESTING OF GRAVITY SEWER MAINS
3. VACUUM TESTING OF MANHOLES.
4. EXFILTRATION TESTING OF WETWELLS AND VALVE VAULTS.
5. BACTERIOLOGICAL TESTS.
6. LIFT STATION START-UP.

CALIBRATED TEST EQUIPMENT SHALL BE ON SITE TO VERIFY THE LOSS OF TEST LIQUID DURING ALL POLYETHYLENE, POLYVYNALCHLORIDE, DUCTILE IRON, AND TAPPING SLEEVE PRESSURE TESTING. ALL GAUGES USED IN TESTING SHALL BE OIL FILLED.

PRESSURE TESTING SHALL NOT EXCEED 1500 LINEAR FEET.

BACTERIOLOGICAL TESTING SHALL NOT EXCEED 1200 LINEAR FEET.

A QUALIFIED REPRESENTATIVE FROM CHARLOTTE COUNTY UTILITIES ENGINEERING MUST BE PRESENT DURING ALL TESTING.

GRAVITY SEWER SYSTEM (INCLUSIVE OF LINES AND MANHOLES) WILL ONLY BE TESTED AFTER PLACEMENT AND COMPACTION OF BACKFILL AND BASE (IF APPLICABLE) MATERIALS ARE COMPLETED.

ALL REFERBISHED MANHOLES AND REPAIRED GRAVITY SEWER MAINS SHALL BE TESTED PER THE APPLICABLE REQUIREMENTS AS NOTED BELOW.

LOW PRESSURE FORCE MAIN SHALL BE TESTED AT 100 PSI.

**POLYVINYLCHLORIDE (PVC), DUCTILE IRON (DI), AND TAPPING SLEEVE PRESSURE TESTING:**

POLYVYNALCHLORIDE, DUCTILE IRON, AND TAPPING SLEEVE PRESSURE TESTING SHALL BE IN ACCORDANCE WITH THE LATEST REVISION OF ANSI/AWWA C-600. IF THE PIPING TO BE TESTED INCLUDES SECTIONS OF POLYETHYLENE PIPE, THE POLYETHELENE PIPING SHALL MEET THE HIGHER TEST REQUIREMENTS. TESTING OF ISOLATED PORTIONS BETWEEN VALVES WITHIN THE TEST SECTION MAY BE REQUIRED BY CHARLOTTE COUNTY UTILITIES IF A PORTION OF THAT LINE APPEARS QUESTIONABLE.

THE TEST SHALL BE CONDUCTED AT 150 PSI FOR TWO (2) HOURS

$$\text{ALLOWABLE LOSS IN GALLONS FOR TWO (2) HOURS} = \frac{(D)(L)(PY) \times 2}{133.200}$$

WHERE                    D = NOMINAL DIAMETER OF THE PIPE IN INCHES  
                                   L = LENGTH OF PIPE  
                                   PY = SQUARE ROOT OF THE TEST PRESSURE IN POUNDS PER SQUARE INCH

\*NO PRESSURE LOSS IS ALLOWED FOR TAPPING SLEEVE TESTING.

**POLYETHYLENE PRESURE TESTING:**

WATER AND SEWER MAINS CONSTRUCTED OF ONLY POLYETHYLENE PIPING SHALL BE TESTED IN FOUR PHASES:

1. FILLING PHASE: FILL THE RESTRAINED TEST SECTION COMPLETELY WITH WATER. ENSURE THERE IS NO AIR TRAPPED IN THE TEST SECTION. USE EQUIPMENT VENTS AT HIGH POINT TO REMOVE AIR. WARNING: FAILURE WITH ENTRAPPED AIR CAN RESULT IN AN EXPLOSIVE RELEASE RESULTING IN DEATH OR SERIOUS BODILY INJURY.
2. INITIAL EXPANSION PHASE: GRADUALLY PRESSURIZE THE TEST SERCTION TO 160 PSI AND MAINTAIN THIS PRESSURE FOR THREE (3) HOURS. DURING THE INITIAL EXPANSISON PHASE, POLYETHEYLENE PIPE WILL EXPAND SLIGHTLY. ADDITIONAL TEST LIQUID MAY BE REQUIRED TO MAINTAIN THE INITIAL EXPANSION PHASE PRESSURE, BUT IT IS NOT NECESSARY TO MONITOR THIS AMOUNT OF TEST LIQUID ADDED.

DATE: 1/1/2008	<b>QUALITY ASSURANCE</b>	PROVIDED FOR INFORMATIONAL PURPOSES ONLY. NO MODIFICATIONS WITHOUT WRITTEN CCU APPROVAL.
DRAWN BY: DEC		PAGE No. 10
APPROVED BY: TGD	<b>CHARLOTTE COUNTY UTILITIES</b>	NUMBER: QA - 1 - 3

3. TEST PHASE: IMMEDIATELY FOLLOWING THE INITIAL EXPANSION PHASE, REDUCE THE TEST PRESSURE BY TEN (10) PSI TO 150 PSI AND STOP ADDING WATER. THE TEST WILL BE CONDUCTED FOR ONE (1) HOUR.
4. DEPRESSURIZING PHASE: AT THE CONCLUSION OF THE TEST, CAREFULLY DEPRESSURIZE THE TEST SECTION BY A CONTROLLED RELEASE OF THE TEST LIQUID.

IF THE TEST PRESSURE REMAINS WITHIN 5% OF 150 PSI FOR ONE (1) HOUR, THE TEST IS PASSED.

**GRAVITY SEWER MAIN AIR TESTING:**

ALL GRAVITY SEWER PIPE SHALL BE AIR TESTED AS FOLLOWS:

1. THE SECTION OF SEWER PIPE TO BE TESTED SHALL BE FLUSHED AND CLEANED PRIOR TO THE AIR TEST.
2. SECTION OF PIPE TO BE TESTED SHALL BE ISOLATED WITH AIR FILLED STOPPERS OR PLUGS SUITABLE FOR AIR TESTING.
3. ADD AIR SLOWLY TO TEST SECTION SO THAT THE TEST PRESSURE EQUALS 4.0 PSIG + 0.43 PSIG FOR EACH FOOT OF GROUNDWATER ABOVE THE PIPE.
4. MAINTAIN AIR PRESSURE WITHIN 0.5 PSIG OF THE TEST PRESSURE BY REGULATING THE AIR SUPPLY FOR A PERIOD OF 2 MINUTES. THIS WILL ALLOW FOR TEMPERATURE STABILIZATION.
5. AFTER 2 MINUTES DISCONNECT THE AIR SUPPLY AND ADJUST THE PRESSURE IN THE PIPE TO 3.5 PSIG + 0.43 PSIG FOR EACH FOOT OF GROUNDWATER.
6. USING A STOP WATCH, MEASURE THE TIME REQUIRED FOR A 1 PSIG DROP IN PRESSURE.
7. COMPARE THE RECORDED TIME WITH THE ALLOWABLE TIME IN THE FOLLOWING TABLE:

LENGTH OF TEST SECTION (FEET)	TEST TIME (MIN:SEC)	
	8" DIA. PIPE	10" DIA. PIPE
150 & LESS	7:34	9:26
175	7:34	9:26
200	7:34	9:26
225	7:34	9:53
250	7:34	9:53
275	7:35	11:52
300	7:35	11:52
325 & GREATER	8:50	13:50

8. IF THE RECORDED TIME IS LESS THAN ALLOWABLE LOSS, THEN REPLACE THE DEFECTIVE FITTINGS AND PIPE AND RETEST UNTIL A SATISFACTORY TEST IS ACHIEVED.

**GRAVITY SEWER MAIN FLOW TESTING:**

ALL INSTALLED GRAVITY SEWER MAIN PIPING SHALL BE WASHED WITH A HIGH PRESSURE WATER HOSE AND TELEVISED WITH IN-LINE VIDEO CAMERA HAVING PAN AND TILT CAPABILITIES. A CALIBRATED DEPTH GAGE SHALL BE MOUNTED TO ALLOW THE CAMERA TO SHOW THE RESIDUAL WATER IN THE MAIN. DEVIATION FROM LINE OR GRADE SHALL NOT BE MORE THAN ½ INCH FOR LINEAR AND ½ INCH FOR GRADE. ALL SEWER LATERALS WILL BE INSPECTED. A COPY OF THE VIDEO TAPE WILL BE PROVIDED TO THE PROJECT ENGINEER FOR REVIEW WHO INTURN WILL FORWARD IT TO CHARLOTTE COUNTY UTILITIES FOR FINAL APPROVAL.

DATE: 1/1/2008	<b>QUALITY ASSURANCE</b>	PROVIDED FOR INFORMATIONAL PURPOSES ONLY. NO MODIFICATIONS WITHOUT WRITTEN CCU APPROVAL.
DRAWN BY: DEC		PAGE No. 11
APPROVED BY: TGD		NUMBER: QA - 2 - 3
<b>CHARLOTTE COUNTY UTILITIES</b>		

**WET WELL AND VALVE VAULT TESTING:** THE TEST SHALL CONSIST OF PLUGGING ALL INLETS AND OUTLETS, FILLING THE WETWELL OR VALVE VAULT WITH WATER TO THE RIM OF THE STRUCTURE, AND LETTING THE WATER REMAIN FOR 24 HOURS. THE WATER LEVEL IS RETURNED TO THE TOP OF THE RIM AND LET STAND FOR 2 HOURS. NO LEAKAGE SHALL BE ALLOWED.

**MANHOLE TESTING:** ALL MANHOLES SHALL BE VACUUM TESTED PER THE FOLLOWING TABLE. ALL INLETS AND OUTLETS SHALL BE PLUGGED USING AIR INFLATED OR OTHER TYPES OF PLUGS.

MANHOLE DEPTH (FEET)	MIN. TEST TIME (IN SECONDS)	INDUCE A BACKPRESSURE OF 5.0 PSI, EQUIVALENT TO 10" Hg(MERCURY). ALLOWABLE LOSS IS LESS THAN 1" Hg FOR THE LENGTH OF TIME SPECIFIED.
(A)4" DIA. MH		
4	10	
6	15	
8	20	
10	25	
12	30	
14	35	

**BACTERIOLOGICAL TESTING:**

BACTERIOLOGICAL TESTS SHALL BE PERFORMED ON ALL NEW AND ANY EXISTING WATER PIPING TAKEN OUT OF SERVICE, REPAIRED, OR EXPOSED.

CHLORINATION OF THE WATER PIPING SHALL BE ONLY DONE BY THE CONTINUOUS FEED METHOD USING EITHER A LIQUID CHLORINE GAS-WATER MIXTURE OR A CALCIUM OR SODIUM HYPOCHLORITE SOLUTION. DIRECTLY FEEDING THE CHLORINATION, PLACING CONCENTRATED QUANTITIES OF COMMERCIAL DISINFECTANTS SUCH AS CALCIUM HYPOCHLORITE GRANULES IN THE LINE PRIOR TO FILLING WITH WATER, SHALL NOT BE USED.

THE COLLECTION OF BACTERIOLOGICAL TEST SAMPLES SHALL BE CONDUCTED BY A CERTIFIED LABORATORY. THE SAMPLES SHALL BE TAKEN FROM SAMPLE POINTS, BLOW-OFFS, OR WATER SERVICES. NO SAMPLES SHALL BE TAKEN FROM A FIRE HYDRANT.

**PUMP STATION STARTUP:** THE FOLLOWING ITEMS WILL BE REVIEWED DURING A PUMP STATION STARTUP:

POWER: VOLTAGE, PHASE, AND FPL METER NUMBER.

INDIVIDUAL PUMP DATA: MANUFACTURER, MODEL, HORSE POWER, IMPELLER SIZE, SERIAL NUMBER, AND AMPERES.

DRAW DOWN DATA: DISTANCE FROM THE TOP OF THE WET WELL TO THE CENTER OF THE DISCHARGE PIPE, DISTANCE FROM THE CENTER OF DISCHARGE TO CENTER OF PRESSURE GAUGE, AND WET WELL DIAMETER.

1. INFLOW: START, STOP, FLOW TIME, AND GPM.
2. PUMP1, PUMP 2, AND BOTH PUMPS: START, STOP, RUN TIME, STATIC HEAD, DYNAMIC HEAD GPM. CONTROL PANEL AND RTU TESTS: FLOAT SEQUENCE TEST, ALARMS, RTU COMMUNICATIONS, FLOAT LEVELS SET, AND RTU ID NUMBER.

DATE: 1/1/2008	<b>QUALITY ASSURANCE</b>	PROVIDED FOR INFORMATIONAL PURPOSES ONLY. NO MODIFICATIONS WITHOUT WRITTEN CCU APPROVAL.
DRAWN BY: DEC		PAGE No. 12
APPROVED BY: TGD	<b>CHARLOTTE COUNTY UTILITIES</b>	NUMBER: QA - 3 - 3