

6. Settlement in backfill during exfiltration tests will be taken as an indication of leakage.

B. Low Pressure Air Joint Test:

1. All pipe joints shall be tested in accordance with ASTM C1103 as follows:
2. Equipment shall be the product of manufacturers having more than five years regular production of successful joint testers. Joint tester shall be as manufactured by Cherne Industrial, Inc., of Edina, Minnesota, or approved equal.
3. 100 percent of all joints shall be field tested, prior to the placement of backfill over the springline of the pipe, after the pipe has been substantially locked in to place by embedment. If the pipe does not pass the field air test, the joint will be pulled and refitted or rejected and removed from the project. After full placement of backfill and proper compaction, 100% of all joints will be tested again, as the installation progresses. At no time shall pipe installation exceed 300 feet beyond the last joint tested.
4. No more than 2 percent of the total number of joints failing to meet the requirements of this test shall be field repaired by joint grout injection, or band clamps, or other method. Any joints over 2% requiring field repairs shall be rejected and removed from the project site. Rejected pipe shall be removed from the project. Installation shall be stopped until defective joints are repaired or replaced.
5. Follow equipment manufacturer's recommendations when performing tests; only experienced technicians shall perform tests.
6. The testing equipment shall be assembled and positioned over the center of the pipe joint and the end element tubes inflated to a maximum of 25 psi.
7. Pressurize the center joint test area to 4.0 psig and allow the temperature and pressure to stabilize at the minimum of 2.5 psig for a period of 2.0 minutes prior to testing.
8. To test, adjust the pressure to 3.5 psig and measure the time required to decrease the pressure from 3.5 psig to 2.5 psig.
9. The joint is acceptable if the time for the pressure to drop from 3.5 psig to 2.5 psig is greater than 15 seconds.
10. If a double gasket concrete pipe joint design is used, a Cherne style testing device is not required to test the joint. Joint shall be tested by pressurizing the space between gaskets using the test port provided. Grout seal the test port after successful testing.

TEST
ONCE...

TEST AGAIN!

C. Deflection Test

1. For all flexible and/or semi-rigid non-metallic, non-concrete pipe such as CCFRP, PE, FRP, etc., a deflection test shall be performed in addition to any other required leakage tests.
2. Two deflection tests using a mandrel will be required for each pipe segment after installation. The first deflection test shall be performed after the pipe has been completely installed and backfilled where a mandrel shall be pulled through the entire line segment to determine whether the maximum allowable percent of deflection has been exceeded. The first deflection test shall be

MANDREL
TEST REQ'D.
FOR HOBAS -

LINE
TO

GREAT! (U&C IS 30 DAYS)

performed a maximum of 800 feet behind pipe laying operations. A second test shall be performed following installation of the entire line but a minimum of three (3) months after installation and backfill for any section by pulling a mandrel through the entire line to determine whether the maximum allowable deflection percent has been exceeded.

- 3. The diameter of the mandrel shall be the maximum allowable percent deflection specified less than the inside diameter of the sewer line. The maximum allowable percent deflection shall be based on the nominal diameter. All mandrels and measurements shall be based on the nominal diameter [i.e., 42-inch nominal pipe diameter with a maximum 5 percent deflection requirement will have a maximum allowable 5 percent deflection of 2.1 inches ($0.05 \times 42 = 2.1$); a mandrel outside diameter (minimum) of 39.9 inches ($42 - 2.1 = 39.9$); and a minimum deflection measurement of 39.90 inches].
- 4. In cases where the mandrel may hang due to excess deflection, the pipe shall be uncovered at this point and the conditions shall be corrected. Correction may be by reworking of the embedment and backfill, or by replacing that section of the pipe. This portion of the pipe shall again be backfilled, and the mandrel pulled through again, and this process repeated until the pipe is clear of all obstructions. The test shall be performed without mechanical pulling devices.

3.02 TESTING OF PRESSURE LINES

- A. General:
 - 1. Allow concrete blocking to cure for at least 7 days before testing.
 - 2. Backfill and compact soil behind all blocking.
 - 3. Backfill over pipe to extent necessary to restrain the piping. Backfill shall extend to within 1-foot of proposed final grade.
 - 4. Conduct water leakage test after completing hydrostatic pressure tests.
 - 5. Lines which fail to hold the specified test pressure for at least two hours or which exceed an allowable leakage rate specified below, shall be repaired and retested at the CONTRACTOR's expense.
- B. Procedures for Leakage and Hydrostatic Pressure Tests:
 - 1. Slowly fill isolated section of line with water.
 - 2. Insure that all air has been expelled through air and vacuum release valves, taps, or connections shown on Plans for permanent piping, valves, or accessories. Do not make additional taps solely for air expulsion purposes unless approved by ENGINEER. No additional compensation will be made for additional taps.