

San Antonio Water System Standard Specifications for Construction

ITEM NO. 849
AIR AND DEFLECTION TESTING
(SANITARY SEWER)

849.1 **DESCRIPTION:** This item shall consist of air and deflection test in accordance with this specifications.

849.2 **MATERIALS:** The materials for air and deflection test shall conform to the appropriate specifications contained within the latest revision of SAWS Material Specifications.

849.3 **TESTING OF INSTALLED PIPE:** An infiltration, ex-filtration or low-pressure air test shall be specified. Copies of all test results shall be made available to the Inspector upon request. Tests shall conform to the following requirements:

1. Low Pressure Air Test: The procedure for the low pressure air test shall conform to the procedures described in ASTM C-828, ASTM C-924, ASTM F-1417 or other appropriate procedures, except for testing times. The test times shall be as outlined in this section. For sections of pipe less than 36-inch average inside diameter, the following procedure shall apply unless the pipe is to be joint tested. The pipe shall be pressurized to 3.5 psi greater than the pressure exerted by groundwater above the pipe. Once the pressure is stabilized, the minimum time allowable for the pressure to drop from 3.5 pounds per square inch gauge to 2.5 pounds per square inch gauge shall be computed from the following equation:

$$T = \frac{0.085 \times D \times K}{Q}$$

T = Time for pressure to drop 1.0 pound per square inch gauge in seconds

K = 0.000419xDxL, but not less than 1.0

D = Average inside pipe diameter in inches

L = Length of line of same pipe size being tested, in feet

Q = Rate of loss, 0.0015 cubic feet per minute per square foot internal surface shall be used since a K value of less than 1.0 shall not be

San Antonio Water System Standard Specifications for Construction

used.

There are minimum testing times for each pipe diameter as follows:

Pipe Diameter	Minimum Time	Length for Minimum Time	Time for Longer Length
Inches	Seconds/Ft	Feet	Seconds/Ft
6	340	398	0.855
8	454	298	1.520
10	567	239	2.374
12	680	199	3.419
15	850	159	5.342
18	1,020	133	7.693
21	1,190	114	10.471
24	1,360	100	13.676
27	1,530	88	17.309
30	1,700	80	21.369
33	1,870	72	25.856

* Note: Test time starts after the required 60 seconds of stabilization time.

The test may be stopped if no pressure loss has occurred during the first 25% of the calculated testing time. If any pressure loss or leakage has occurred during the first 25% of the testing period, then the test shall continue for the entire test duration as outlined above or until failure. Lines with a 27 inch average inside diameter and larger may be air tested at each joint. Pipe greater than 36" diameter must be tested for leakage at each joint. If the joint test is used, a visual inspection of the joint shall be performed immediately after testing. The pipe is to be pressurized to 3.5 psi greater than the pressure exerted by groundwater above the pipe. Once the pressure has stabilized, the minimum time allowable for the pressure to drop from 3.5 pounds per square inch gauge to 2.5 pounds per square inch gauge shall be 10 seconds.

2. Deflection Testing: Deflection test shall be performed on all flexible pipes. For pipelines with inside diameters less than 27", a

San Antonio Water System Standard Specifications for Construction

rigid mandrel shall be used to measure deflection. For pipelines with an inside diameter 27" and greater, a method approved by the Engineer or Inspector shall be used to test for vertical deflections. Other methods shall provide a precision of $\pm 0.2\%$ deflection. The test shall be conducted after the final backfill has been in place at least 30 days. No pipe shall exceed a deflection of five percent. If a pipe should fail to pass the deflection test, the problem shall be corrected and a second test shall be conducted after the final backfill has been in place an additional 30 days. The tests shall be performed without mechanical pulling devices. The design engineer should recognize that this is a maximum deflection criterion for all pipes and a deflection test less than 5 % may be more appropriate for specific types and sizes of pipe. Upon completion of construction, the design engineer or other Texas Registered Professional Engineer appointed by the owner shall certify, to the Construction Manager, that the entire installation has passed the deflection test. This certification may be made in conjunction with the notice of completion required in 317.1(e) (1) of this title (relating to General Provisions). This certification shall be provided for the Commission to consider the requirements of the approval to have been met.

- a. Mandrel Sizing. The rigid mandrel shall have an outside diameter (O.D.) equal to 95% of the inside diameter (I.D.) of the pipe. The inside diameter of the pipe, for the purpose of determining the outside diameter of the mandrel, shall be the average outside diameter minus two minimum wall thicknesses for O.D. controlled pipe and the average inside diameter for I.D. controlled pipe, all dimensions shall be per appropriate standard. Statistical or other "tolerance packages" shall not be considered in mandrel sizing.
- b. Mandrel Design: The rigid mandrel shall be constructed of a metal or a rigid plastic material that can withstand 200 psi without being deformed. The mandrel shall have nine or more "runners" or "legs" as long as the total number of legs is an odd number. The barrel section of the mandrel shall have a length of at least 75% of the inside diameter of the pipe. A proving ring shall be provided and used for each size mandrel in use.
- c. Method Options: Adjustable or flexible mandrels are

San Antonio Water System Standard Specifications for Construction

prohibited. A television inspection is not a substitute for the deflection test. A deflectometer may be approved for use on a case by case basis. Mandrels with removable legs or runners may be accepted on a case by case basis.

849.4 **MEASUREMENT:** Air and Deflection Testing will not be measured for payment.

849.5 **PAYMENT:** No direct payment shall be made for Air and Deflection Testing, and all costs in connection therewith shall be included in the applicable contract price for the item to which the work pertains.