



MICHELS PIPE SERVICES

P.O. Box 128 • 817 West Main St. • Brownsville, WI 53006-0128
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SMOKE TESTING

1. INTENT

The intent of smoke testing sewers is to detect sources of inflow . . . area drains, abandoned building sewers, storm sewer cross connections, roof downspouts, and illegal connections. Smoke testing is not intended to detect sources of infiltration such as leaking joints and faulty building sewers.

2. GENERAL

Smoke testing is performed by blowing a high volume of very low-pressure smoke into the sewer at one or more manholes. Plugs or sandbags are used to confine the smoke to the section or sections of sewer being tested. Observation of the emergence of smoke enables the crew to deduce sources of inflow.

Every building served by the sewer will usually have two or more roof vents from which smoke will emerge. The roof vents (usually one for each trap) are not sources of inflow and are ignored. The residents and fire departments must be told to ignore the smoke as well.

Since the sewer is connected to roof vents at every building, the smoke has very low pressure regardless of the pressure capability of the smoke blower. Smoke will not escape through pipe defects (infiltration sources) which are below the groundwater table. Smoke may escape through pipe defects which are above the groundwater table, but the smoke must find a path to the surface in order to be observed. Smoke emerging from the ground or from cracks in the street surface indicates pipe defects above the groundwater table, but does not indicate the type or exact location of the defects.

3. EQUIPMENT

Blowers suitable for smoke testing sewers have a circular flange or plate for mounting on an open manhole and are gasoline engine driven. A small gasoline engine can develop about 3 horsepower compared to 1 horsepower for the largest practical-size electric motor. Blowers recommended for smoke testing have a free-air delivery of at least 1700 CFM. The static pressure capability of the blowers is less than an inch of water pressure (1.0 inch of water = 0.036 psi).

4. SMOKE

Smoke used for smoke testing sewers is cold and very visible (white). The smoke is not hazardous and is free of oil and colored particles which could leave residue and stains. Smoke "bombs" recommended for smoke testing are usually 3- or 5-minute duration.

Smoke is introduced into the sewer either by placing a smoke "bomb" at the blower inlet or by lowering the smoke "bomb" into the manhole in a bucket and blowing air in from above.



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The inspector should understand that the smoke bombs are not dangerous and have a limited shelf life. Once opened, a package of smoke bombs should be used. Smoke bombs exposed to moisture or humidity may be difficult, if not impossible, to ignite.

5. ADVANCE NOTICES

Prior to performing smoke testing of sewers, residents are notified of the purpose and approximate date of the work. Residents are told that they will see smoke emerging from their roof vents and are asked to run water into all drains to insure that the traps are not dry.

Local fire and police departments should be advised daily of the areas being tested, on a street-to-street basis. Personnel handling telephone inquiries should be acquainted with the purposes of the smoke-testing program.

6. SMOKE TEST PROCEDURES

6.1 Advance notice is given to residents, fire and police departments.

6.2 The manhole section or sections to be tested are isolated. One method is to use sandbags filled with medium-weight material which can be swung into place by the use of a rope from the street surface. The incoming pipe of the upstream manhole and then the outgoing pipe of the downstream manhole are blocked. Care must be taken, when blocking the outgoing pipe of the downstream manhole, to prevent sewage flow from backing up and pushing the sandbag into the outgoing pipe.

6.3 The smoke blower is set up at an open manhole. Best results and control are achieved when only one manhole section is tested at a time. The blower is usually located at the upstream manhole because the outgoing pipe may be set up at a center manhole and both upstream and downstream sections can be tested simultaneously. Testing more than two manhole sections at a time is less effective and gives the crew too much territory to observe during the relatively short life of the smoke bombs (3 or 5 minutes).

6.4 The smoke blower is started and given a brief warm-up to the side of the open manhole. A smoke bomb is ignited, placed in a bucket and lowered into the manhole. The blower is then positioned on the open manhole and set at full throttle.

6.5 In less than a minute, smoke will be issuing from the roof vents of buildings and any directly connected points of inflow.

6.6 A smoke testing crew usually consists of three persons. One individual operates and maintains the blower while the other two walk the test area to locate and document inflow sources indicated by emerging smoke.



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6.7 The crew documents significant and identifiable points of inflow. Documentation should be referenced to each manhole section tested (e.g.: A01-A02). Sketches, field notes, portable tape recordings, polaroid photographs and hand held V.C.R. recorders can be used to record test results. A set of boldly numbered cards on heavy stock can be used to relate photographs of inflow sources to the sketches and field notes.

6.8 Those firms bidding on this type of work should have a documented history of five years of successful smoke testing. References and dates are to be submitted with bids.

6.9 All bidders will be licensed contractors and perform a minimum of 60 percent of the contract.