

# Superior<sup>®</sup> Smoke for Sewer Testing

Underground Detection

## The "Superior<sup>®</sup> Smoke Testing Technique"

Still the Industry Standard today, thousands of Municipalities in all 50 States and around the world have used this method of Smoke Testing with great success for over 50 years. Hundreds of millions of feet of Sanitary Sewer Mains have been effectively tested using Superior<sup>®</sup> Smoke products, eliminating countless faults - and the SSO's that would result from them.



Developed by Superior Signal in 1961, Smoke Testing is the most cost effective method to find sources of surface water inflow into Sanitary Sewers. Smoke Testing can quickly and easily find many faults that are difficult or impossible to find any other way, and provide clear proof of faults that need to be addressed - on both public and private property.



Smoke Testing not only saves money - it is essential to protecting our Environment. Every year up to 75,000 SSO's dump Billions of gallons of raw sewage into our most sensitive environments. Reducing surface water inflow is often the cheapest and fastest way to reduce SSO's and the pollution they cause.

Superior<sup>®</sup> Smoke Products offer the highest quality and are designed to meet the recommendations of NASSCO, EPA & WEF.

## Smoke Testing

Smoke Testing is **the most cost effective method** to find sources of surface water inflow - the leading cause of wet weather SSO's. Fast and easy to do, Smoke Testing produces immediate results that can be acted on quickly - often at minimal expense to the Municipality. Common sources of sewer inflow are:

- Roof Downspouts
- Cellar Drains
- Sump Pumps
- Yard / Foundation Drains
- Cross Connected Sanitary & Storm Sewer Lines
- Leaking Manholes
- Broken Laterals
- Abandoned Sewer Lines
- Unconnected Sewer Lines



## Superior<sup>®</sup> Classic Smoke Candles

Superior<sup>®</sup> Classic Smoke Candles quickly and efficiently produce a dense white smoke ideal for smoke testing. Disposable and simple to use, no external power or heat source is required. Due to its high visibility and excellent persistence, Classic Smoke provides the best results, allowing you to locate difficult leaks at greater distances when Sewer Testing.



Classic Smoke Candles

## Superior<sup>®</sup> Smoke Fluid Systems

Superior<sup>®</sup> Smoke Fluid systems are safe, inexpensive and easy to use. Superior<sup>®</sup> Smoke Fluid is a proprietary blend, specially formulated for optimum performance in Sewer Testing.

Superior<sup>®</sup> Smoke Blowers are engineered to maximize dry smoke output, eliminating the wet smoke and mess typical of other liquid smoke systems. Superior<sup>®</sup> Smoke Fluid Systems use micro-control flow valves, custom-machined stainless steel injector nozzles, and custom-welded double-insulated heating chambers to generate the maximum volume of dry smoke.



Superior Smoke Fluid



Model 30-L Liquid System



Double Insulated Heating Chamber



Custom Fluid Injector



Model 20-S Smoke Blower



For more info on Smoke Testing see ov



## How to Smoke Test

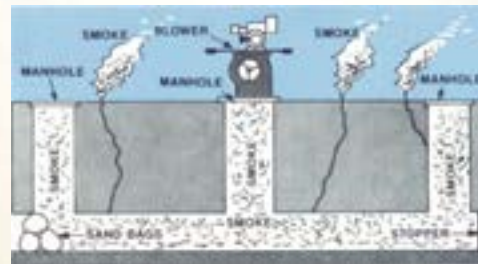
**Budget:** The Superior® Smoke Testing Technique costs only a fraction of most other inspection methods. Total initial investment for all equipment will typically be under \$3,000, and often less than \$2,000 as usually some of the equipment is already on hand. The consumables – either Classic Smoke Candles or Smoke Fluid – are also very inexpensive. The total cost of amortized equipment and smoke products should be well under 3 cents per linear foot of Main tested. Labor is variable depending on local costs and productivity, but would likely be in the range of 10 to 20 cents per linear foot. Total Budget therefore – including Equipment, Smoke, and Labor is typically a **total cost of only 15 to 20 cents per linear foot of Sewer Main.**

**Personnel:** The Superior® Smoke Testing Technique is relatively simple and can easily be performed by 2-3 regular maintenance crew members once they are trained in Smoke Testing. This small crew can easily test 10,000 linear feet of sewer main line in an eight-hour shift, with just the simple equipment listed below.

**Equipment:** A Smoke Blower designed to sit on and blow into an open manhole, with 1500 to 2000 CFM capacity is ideal for most situations. Up to 4500 CFM may be used for larger systems or longer runs, however more than this is not recommended. The objective is to generate adequate smoke flow to find the faults – excessive flow can dilute the smoke, bypass faults, blow out traps, and result in a less effective test. Superior® Smoke Blowers #10, #20, and #30 are all designed to meet these requirements, and have been engineered specifically for Smoke Testing. Each of these Blowers can be configured to use Smoke Fluid and/or Classic Smoke Candles. Other recommended equipment includes:

- Superior® Smoke Candles or Superior® Smoke Fluid.
- Digital Camera – to document leaks and their location.
- Work Sheets or Paper – to document and/or sketch faults and related information.
- Stakes, Flags, and/or Paint – to mark faults and their location.
- Line Plugs, Stoppers, Sandbags, or Rubber/Canvas Flaps – to block off or contain Smoke.
- Smoke Testing Advance Notification and/or other Handouts – for building occupants.

**How Smoke Testing Works:** Sewer Mains should be broken down to two sections of line between 600-800 feet. Usually the two sections of line are tested simultaneously, with the Smoke being introduced through a centrally located manhole. This requires 5 to 6 minutes of Smoke generation to provide enough time to walk the test area. Blocking the far side of the upstream & downstream manholes is not required, but is recommended for optimum results – and to prevent Smoke going beyond the intended test area. Smoke under pressure will quickly fill the Main and all connected lines and laterals, following the path of least resistance. Only enough pressure to sufficiently overcome atmospheric pressure is required – Smoke will flow through all openings to the surface, and should come out roof vents throughout the test area. Any Smoke not from a proper vent indicates a fault where surface water can flow into the Sanitary Sewer. Smoke tests are effective regardless of surface, type of soil, or depth, provided openings exist for the Smoke to follow. For example, it is not uncommon to see Smoke exiting from cracks in paved surfaces or lawns, showing points of surface water entry.



**Smoke Testing Procedure:** The blower should be started first, and then placed over the manhole to safely vent potentially flammable sewer gasses. Run the blower for a minute or two to establish a flow, and then introduce the Smoke – in less than a minute, Smoke will be issuing from the roof vents of all buildings connected to the line. The crew should immediately walk throughout the test area, checking buildings, grounds, and streets for any signs of Smoke. Any faults indicated by Smoke should be immediately photographed and documented. If plugs are being used, do not tighten them before the Smoke has fully penetrated the line, otherwise trapped air may prevent complete penetration of the Smoke. Smoke immediately backing up into the blower indicates a line blockage – if this occurs, testing should be discontinued until the line has been cleared.

**Public Notification:** Proper notification and education of the Public is essential to successful Smoke Testing. This program should begin well in advance, and continue up to the day of testing in each area. Notification and coordination with all local emergency departments is also essential. More information on Notification is available.

**CAUTION:** All smoke, including Superior® Smoke, can irritate breathing passages. Persons with known respiratory sensitivity should not be exposed to any smoke. Breathing protection is required for extended/heavy exposure, however this should not occur if proper testing procedures are employed.