Pipe Joint Leak Detection During Dry Weather
Chuck Hansen
The Next Generation in Sewer Leak Detection

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1. Technology
Pipe Joint Leak Detection During Dry Weather

1. Electricity does not pass through NON-METALLIC pipes
2. Electricity will pass through a pipe defect that can leak water
3. Electro Scan measures variation of electricity passing thru a pipe wall
4. The bigger the defect, the larger the flow of electricity
“If a Pipe Leaks Electricity It Will Leak Water.”

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A Good Sewer Pipe

A Bad Sewer Pipe

Circuit is broken and current cannot flow.

Circuit is Complete so current can flow.
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**Basic Electric Circuit**

*Closed Switch – Bad Pipe*

- **Voltage Source**
- **Electric Current Meter**
- **Surface Electrode**
- **Probe Cable**
- **Pipe full of water at probe location.**
- **Probe**

LOW resistance path through the ground

HIGH resistance, except if there is a leak...even a slight one.
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2. How It Works

Pipe Joint Leak Detection During Dry Weather
Standard Practice for Locating Leaks in Sewer Pipes Using Electro-Scan—the Variation of Electric Current Flow Through the Pipe Wall

This standard is issued under the fixed designation F 2550; the number immediately following the designation indicates the year of original adoption or, in the case of revision, the year of last revision. A number in parentheses indicates the year of last reapproval. A superscript epsilon (ε) indicates an editorial change since the last revision or reapproval.

INTRODUCTION

Infiltration of groundwater into a sewer through defects in the pipe can considerably increase the operation and capital costs of a sewer system.Exfiltration of sewage out of a sewer pipe may cause degradation of aquifers and shoreline waters. Accurate location, measurement, and characterization of all potential pipe leak defects are essential inputs for cost-effective design of pipe renewal or remediation. Commonly used sewer leak assessment methods either do not detect a significant number of large potential pipe leak defects, particularly those caused by faulty joints or service connections, or are too slow or costly or both for widespread application.
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1. Funnel Plug Attached to Jet Hose
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2. Pipe Probe Is Inserted into the Upstream Manhole
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3. Probe Placed in Base of Manhole.
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4. Pipe is Filled with Water from Jet Hose, Pumped through Funnel Plug
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Where no defects there is a very low current flow for sewers made of insulating materials – e.g. Plastic, Clay, Concrete, RCP, Brick,..
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Cracks, Corrosion, Joint or Connection Defects allow Electric Current to Flow through the Pipe Wall.
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- A Current Trace is Displayed on Smartphone
- A Pressure Trace is also shown for Continuously Monitoring Water Level
Increased Electrical Current Flow occurs at All Pipe Defects

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The Greater the Electrical Current, the Larger the Pipe Defect

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Pipe Joint Leak Detection During Dry Weather

Good Connections Do Not Allow Electric Current to Flow Out of the Pipe

- Longitudinal Crack
- Radial Crack
- Defective Connection
- Connection OK
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- Longitudinal Crack
- Radial Crack
- Defective Connection
- Connection OK
- Defective Joint

Graph showing electric current vs. distance.
Field Demonstration of Condition Assessment Technologies for Wastewater Collection Systems
“Taps that were not considered defective from CCTV observations were in fact associated with electro-scan anomalies, indicating leakage potential that is not apparent from visual observation.”

Source: EPA, Section 6.2.2 Comparison of Electro-scanning to CCTV
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CCTV

Electro Scan
For All Lines Tested by U.S. EPA, Electro Scan Identified 2.4X More Leaks.
Electro Scan Identified More Leaks in 90% of Lines.

Of the 97 Service Connections, Electro Scan Identified 75 as Defective compared with 45 Observed by CCTV.

Sewer Main defects missed by CCTV were often the Largest Anomalies shown on the Pipe Segment.
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Over 260,000 Linear of Feet Inspected Using The Electro Scan Method, including work at the following agencies.
Certification of Lining Projects
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Sewer Lateral Inspections

![Image of sewer lateral inspection tool]

[Diagram showing sewer lateral inspection details, including joint leak detection methods and necessary cover depths.]
‘What if Laterals Were NOT the Problem?’
3. Reporting
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Electro Scan Reports are Highly Repeatable.
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Field Solution
Pipe Joint Leak Detection During Dry Weather

Hard Copy Reports
Critical Sewers™

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Legacy CCTV Comparison

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CCTV

Electro Scan
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Joint Identification
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Joint Identification
Not All Joints Are Placed Exactly The Same, but Electro Scan can Map Each One!

New Requirement in Germany, Australia, and New Zealand Wastewater Markets.

GIS & Hydraulic Modeling Can Now Be Studied to the Joint!
4. Summary

ES-38 for Sewer Laterals

ES-660 for Sewer Mains

1. Patents pending.
The Electro Scan process is the first technology that can identify ALL defects that cause Leaks in non-metallic* sewers.

*Brick, Clay, Concrete, Reinforced Concrete, Plastic, etc.
85th Annual Exhibition & Conference
September 29 – October 3, 2012
New Orleans Morial Convention Center
New Orleans, Louisiana USA
THE FUTURE OF SANITARY SEWER EVALUATION STUDIES (SSES) ARE COMING AROUND THE CORNER!

CCTV CAMERAS BLOWN AWAY BY ELECTRO SCAN

ES-660 FOR SEWER MAINS 6” to 60” IN DIAMETER

ES-38 FOR SEWER LATERALS 3” to 8” IN DIAMETER

www.electroscan.com  electro scan inc.
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