New Standard for Sewer Main Condition Assessment

Find Infiltration & Certify Cured-In-Place Pipe

EPA-Referenced 7th EDITION, VOLUME 1, OPERATION AND MAINTENANCE OF WASTEWATER COLLECTION SYSTEMS manual.

Focused Electrode Leak Location (FELL)

Represents the industry’s first reliable, proven, and measurable way to provide unbiased pipe condition assessment without third party interpretation or operator coding. Let Flow Meters show key areas, and FELL show specific locations.

Most Sewer Leaks Can’t Be Seen or Measured Without FELL

Add to Your CCTV Truck or Van
- Aries
- Cues
- Envirosight
- IBAK
- Rausch
- UEMSI
- or Custom

Quantify Flow Reductions From Your Next CIPP Project

Measure Same-Day Pre- & Post-Rehabilitation Defect Flows in GPM.


Services Available From Electro Scan Inc.

1745 Markston Road, Sacramento, California 95825-4026, USA | 916.779.0660 | info@electroscan.com | www.electroscan.com
Comparing CCTV & FELL For Pipe Assessment

<table>
<thead>
<tr>
<th>1</th>
<th>Automatically Finds Potential Sources of Infiltration 360° of Pipe Wall</th>
<th>CCTV</th>
<th>FELL</th>
</tr>
</thead>
<tbody>
<tr>
<td>2</td>
<td>Automatically Finds Leaks Inside Joints Through Bell and Spigot</td>
<td>No</td>
<td>Yes</td>
</tr>
<tr>
<td>3</td>
<td>Automatically Finds Leaks at Service Connections</td>
<td>No</td>
<td>Yes</td>
</tr>
<tr>
<td>4</td>
<td>Automatically Finds Sources of Infiltration at Cracks</td>
<td>No</td>
<td>Yes</td>
</tr>
<tr>
<td>5</td>
<td>Automatically Finds Leak Locations (within 0.4 inches or 1cm)</td>
<td>No</td>
<td>Yes</td>
</tr>
<tr>
<td>6</td>
<td>Automatically Measures Size of Leaks - Estimated in GPM or LPS</td>
<td>No</td>
<td>Yes</td>
</tr>
<tr>
<td>7</td>
<td>Automatically Finds Defects That Leak from Bad Couplings</td>
<td>No</td>
<td>Yes</td>
</tr>
<tr>
<td>8</td>
<td>Automatically Finds Defects That May Still Leak After Repairs</td>
<td>No</td>
<td>Yes</td>
</tr>
<tr>
<td>9</td>
<td>Automatically Finds Defects That Leak in CIPP Lining Projects</td>
<td>No</td>
<td>Yes</td>
</tr>
<tr>
<td>10</td>
<td>Automatically Finds Defects After Service Re-Connections</td>
<td>No</td>
<td>Yes</td>
</tr>
<tr>
<td>11</td>
<td>Automatically Finds Leaks, if Hidden by Silt or Debris on Bottom of Pipe</td>
<td>No</td>
<td>Yes</td>
</tr>
<tr>
<td>12</td>
<td>Able to Conduct Inspections, When Sewer Pipe is Full of Water</td>
<td>No</td>
<td>Yes</td>
</tr>
<tr>
<td>13</td>
<td>Able to Determine Size of Potential Leak, if Roots are Present</td>
<td>No</td>
<td>Yes</td>
</tr>
<tr>
<td>14</td>
<td>Automatically Finds Leaks, if Hidden by Fats, Oils or Grease (FOG)</td>
<td>No</td>
<td>Yes</td>
</tr>
<tr>
<td>15</td>
<td>Able to Determine Size of Leaks, if Pipe Has Encrustation</td>
<td>No</td>
<td>Yes</td>
</tr>
<tr>
<td>16</td>
<td>Requires Active Infiltration to Identify Infiltration</td>
<td>Yes</td>
<td>No</td>
</tr>
<tr>
<td>17</td>
<td>Contains Moving Parts That Can Clog from Excess Debris or Silt</td>
<td>Yes</td>
<td>No</td>
</tr>
<tr>
<td>18</td>
<td>Requires Bypass Pumping During Inspection, if Pipe is Full</td>
<td>Yes</td>
<td>No</td>
</tr>
<tr>
<td>19</td>
<td>Requires Special Training and Certification to Identify Defects</td>
<td>Yes</td>
<td>No</td>
</tr>
<tr>
<td>20</td>
<td>Relies on Visual Observations to Record Defects</td>
<td>Yes</td>
<td>No</td>
</tr>
<tr>
<td>21</td>
<td>Avg. Speed of Inspection (6” - 30” Sewer Main Diameters)</td>
<td>3 ft/min</td>
<td>50 ft/min</td>
</tr>
</tbody>
</table>

Large Diameter Pipe Assessment

A major advantage of Electro Scan’s FELL technology is the ability to assess large diameter pipes. While standard configurations handle diameters up to 30 inches (800mm), larger diameters can be assessed exclusively using Electro Scan Services. Agencies may still assess larger diameter pipes, but if the pipe is not able to be fully surcharged, i.e. water able to fully surround the probe, then the pipe wall will only be assessed from the level of the waterline and below.

Pipe flows may continue, without bypass pumping, and downstream manholes may be temporarily plugged to allow higher water levels to assess a larger portion of the pipe wall. Electro Scan’s ability to track internal pipe pressure allows it to automatically know water levels in the pipe, corresponding with location-based defect readings.
Critical Sewers® Cloud Certifies Water Tightness
Certify repairs & rehabilitation for water tightness in minutes, without operator coding or third party data interpretation.

1. Vitrified Clay Pipe (VCP) Assessment

Good News: Point or spot repairs (Circles 1, 2, & 3) completed by this sewer utility were generally 'Good' (i.e. no electric spikes).

Bad News: Point Repairs left large leaks at end points. And, most of the pipe is still leaking badly.

2. Point Repair Assessment

Point Repairs Were Selected Based on CCTV Inspection!

3. Cured-In-Place Pipe (CIPP) Assessment

Leaks Identified in Pipe Wall from Accidental Cuts, Poor Curing, Defective Reconnections, and Contractor Damage.
**Conveyance**

**Required Flow**
None. Dry Pipe or Fully Surcharged Flow.

**Pipes**
Pipe Diameters: 6 to 30 inch (150 to 800mm)
Pipe Shape: Any, including Circular, Box, Egg-shaped, Oval, and Trapezoidal.
Pipe Materials: Electrically Non-Conductive Pipe Walls, including Asbestos Cement, Brick, Cement Mortar Lined and Coated Steel, Cured-In-Place Pipe, Ductile Iron with Epoxy Coatings, Fiberglass Reinforced Pipe, High-Density Polyethylene Pipe, Prestressed Concrete Cylinder Pipe, Polyethylene, Polyvinyl Chloride, Reinforced Concrete, Vitrified Clay Pipe, etc.

**ES-420**
Dimensions: Length: 32 in (812.8mm); Circumference (Width): 2.875 in (73mm)
Scan Recording: Critical Sewers® Field Laptop PC, Wi-Fi Connection to Critical Sewers® Cloud Application.
Speed: 45-60 ft/minute (15-20 meters/minute)
Operating Temperature: 20°F to 120°F (-7°C to 50°C)
Power Supply: 120VAC / 60Hz - or - 220VAC / 50Hz
Range: 1,500 ft (460m) range from single point of access. Dependent on jet truck hose length.
Current (max): 40 mA
Electrical Array: Focused tri-electrode array
Defect Flow Calculation: ± 30% Accuracy measured in Gallons Per Minute (GPM) or Liters Per Second (LPS).
Defect Location: ± 0.4 inches (1cm)

**Advantages**
1. No manual coding required.
2. Finds 90-100% defects missed by CCTV inspection.
3. Locates & measures leaks in GPM or LPS.
4. No bypass pumping required for inspection.
5. Use in field either rain or shine.
6. Recommended for all Pre- & Post-Rehabilitation.
7. Finds defects inside joints not seen by CCTV.
8. Differentiates superficial cracks from cracks through pipe.
10. Automatically evaluates 360° of pipe wall.
11. Determines water tightness of sewers & lateral connections.
12. Fewer breakdowns. No moving parts.
13. Recommended by WRc, developers of NASSCO CCTV Codes.
14. Reports available in minutes, not hours, days, or weeks.

**Limitations**
1. Does not provide a clock position of defect location inside the pipe, but location is accurate to within 0.4 inches (1cm).
2. Does not scan metallic pipes or fittings, unless there is a coating or liner (minimum of 1-2mm).

**ASTM F2550**
Committee F36 Approved

ASTM F2550-13 standard covers the location & measurement of all cracks, fissures, broken joints, and leaking service connections by measuring the change in electrical current able to pass through defects in a pipe wall. It includes one (1) complete set of funnel cones for 6"-15" diameter pipe assessments.

Plug & Play Design Allows Seamless Integration
With Multi-Conductor CCTV Camera Reels

---

**Automatic, Measurable, & Unbiased Reporting**

---

Ken Kerri, Ph.D., P.E.
Former Chief Project Consultant
Office of Water Programs
California State University Sacramento (CSUS)
Author, Electro Scanning Inspection

ASTM F2550-13 standard covers the location & measurement of all cracks, fissures, broken joints, and leaking service connections by measuring the change in electrical current able to pass through defects in a pipe wall. Separate scans should be taken before and after any pipe repair, relining, or rehabilitation activity.

Section 4.432, Page 247

---

The term Critical Sewers® is a registered trademark, Reg. No. 4,377,244 and may not be used or published using any particular font, style, size or color, without the express written permission of Electro Scan Inc.

1745 Markston Road, Sacramento, California 95825-4026 | 916.779.0660 | info@electroscan.com | www.electroscan.com


Electro Scan Inc. Copyright © 2017.