Pipe Plug Safety Training

Agenda

- History
- Product Overview
  - Where to Use
  - What to Use
  - Pneumatic Plugs
    - Selection
    - Maintenance
    - Storage
  - Why Test – w/ WATER
  - Testing Equipment
  - Safety

CHERNE INDUSTRIES HISTORY

WHO WE ARE…

- Founded in 1953 by Lloyd Cherne
- Based in Minneapolis, MN
- Purchased by Oatey Company 1990
- ISO Quality Registered since 1998
- Warehouses:
  - Minneapolis
  - Omaha
  - Dallas
  - Cleveland
  - San Francisco
  - Toronto

Where Used

Markets

Residential Construction

Commercial Construction

Underground / Waterworks

Application

New Construction

Repair / Remodel

Products

Pneumatic Test Plugs

Mechanical Test Plugs

Testing Equipment & Accessories

Line Acceptance Kit
with Storage Container

Pneumatic Plugs

PLUMBING

- Drain, waste, & vent stack (DWV) testing
  - Test-Balls®, Muni-Balls®, Long Test-Ball®, Clean-Seal®
  - Single size & Multi-size
  - ¾” – 6” diameters

WATERWORKS

- Test-Balls®
- Muni-Balls® & Big Mouth®
- Air-Loc®
- Pillow plugs
- High Pressure plugs
- Remo® plugs
- Point Repair Carrier
- Single size & Multi-size
- 6” – 96” diameters

[iSeries Plug Production Video]

Pneumatic Plugs – Where to Use

WATERWORKS APPLICATIONS

- Blocking flow
  - New I-Series Test-Ball® & REMO® plugs
- Bypassing flow
  - New I-Series Muni-Ball®
- Point repair
  - Point repair carriers (PRC)
- Low pressure air testing / Line acceptance testing
  - New I-Series Air-Loc®

Selecting the Right Plug

KEY QUESTIONS TO ASK?

1. **What is the Application?**
    1. Block Flow?
    2. Sewer Air Test?
    3. Bypassing Flow
2. **What is the diameter of the pipe to be blocked?**
3. **What are the Backpressure Requirements?**
    1. PSI Test
    2. Feet of Head Required
    3. What is the access opening size?
        - (24” nominal manhole opening is 20.5”!)

Selecting the Right Plug

1. Blocking plug: AKA back plug dummy plug, dead end plug, stopper, or Test-Ball (Cherne Trade name for stopper)
2. Bypass plug: AKA flow through, Muni-Ball, Big Mouth Plug
3. Air test Plug: AKA front plug, smart plug, leak locator plug

- **Blocking Plug**

Bypass Plug

Air-Loc Plug

Pneumatic Plugs – Line Acceptance

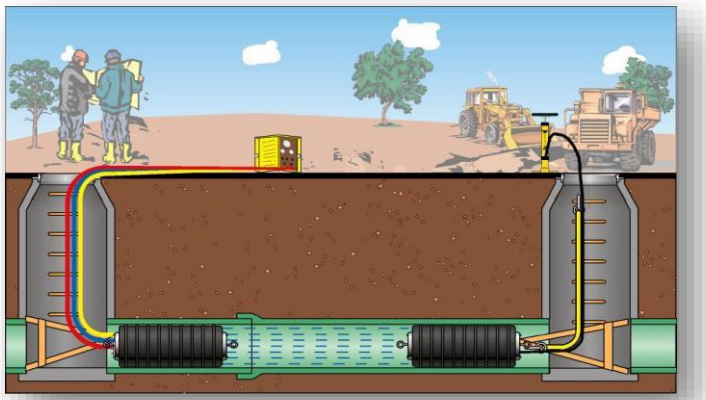
WATERWORKS APPLICATIONS

- Air testing
- Line acceptance testing
- Leak location testing
- ASTM F1417 (PVC pipe)
- ASTM C924 (Concrete pipe)
- ASTM C828 (Clay Pipe)

Air-Loc® and I-Series Video

END USERS

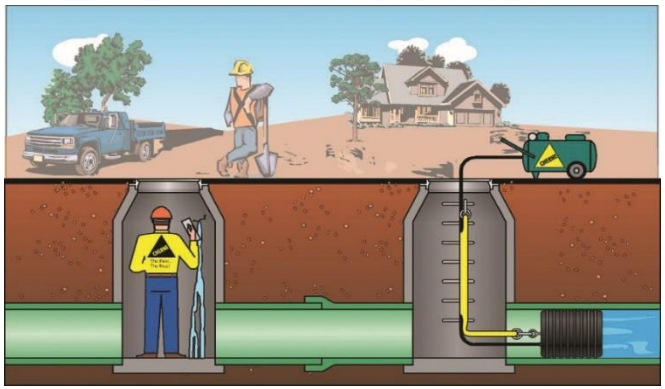
- Municipalities
- Contractors



Pneumatic Plugs – Block / Bypass

WATERWORKS APPLICATIONS

- Blocking flow
- Bypassing flow
- Install new pipes
- Repair old pipes
- Junction boxes
- Install / repair manholes



END USERS

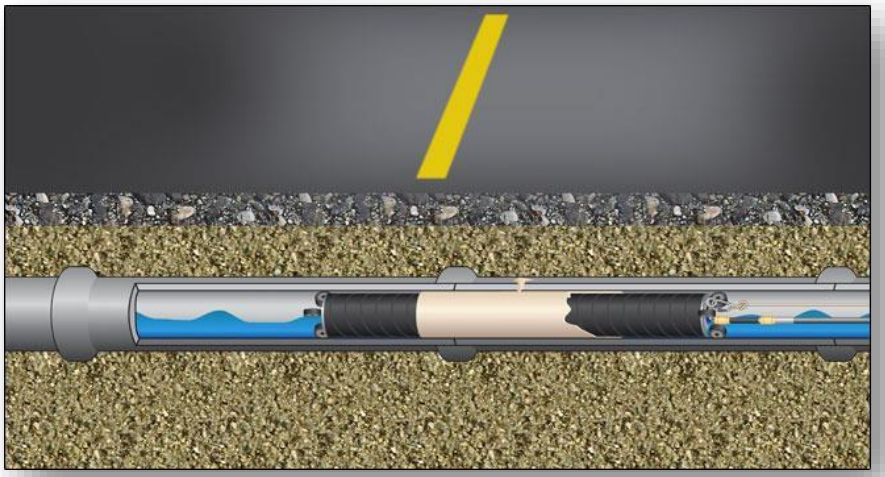
- Municipalities
- Contractors

Pneumatic Plugs – Point Repair

WATERWORKS APPLICATIONS

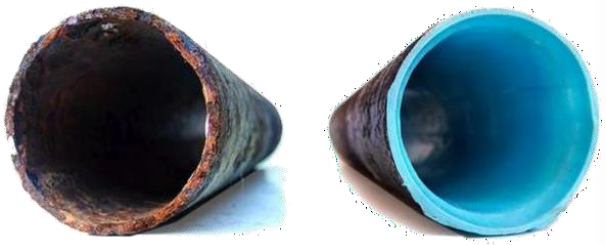
- Point repair
- Cure in place patch repair
- No dig patch repair
- Lateral repairs
- In-line repair

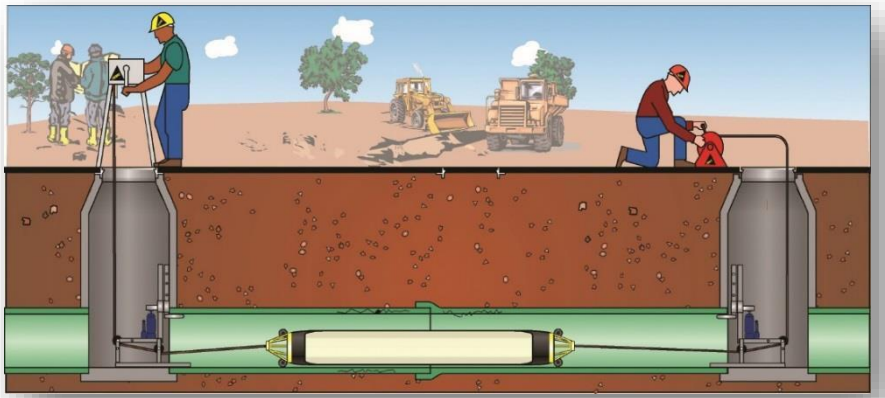
POINT REPAIR VIDEO



END USERS

- Municipalities
- Contractors





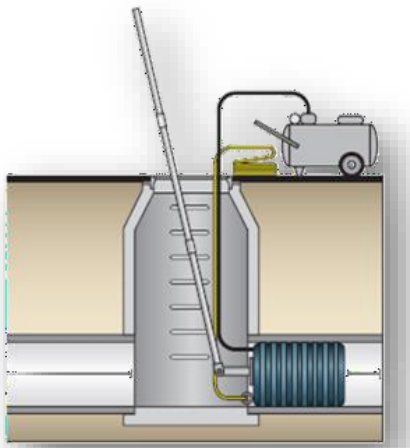
Pneumatic Plugs – Remo®

WATERWORKS APPLICATIONS

- Blocking flow
- Back plug for air testing
- Main advantages
  - eliminates the need to enter confined spaces
  - speeds up the pipe plugging process.

END USERS

- Municipalities
- Contractors



Pneumatic Plugs – Protective Sleeve

WATERWORKS APPLICATION

- Provide protection against puncture and cut hazards from debris, sharp, or foreign objects in pipe
- Extends plug life
- Test-Ball®
- Muni-Ball®
- Air-Loc®
- Remo®

SIZES

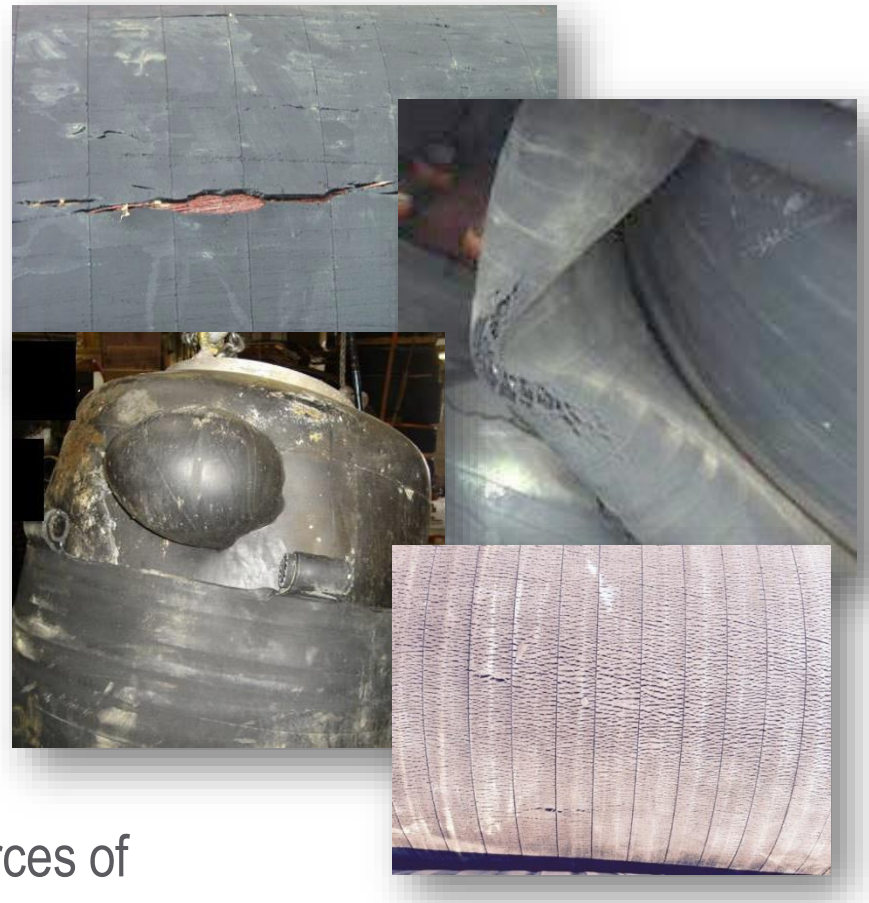
- Available on 12” – 18” diameter plugs and above
- Sold separately or installed
  - Sleeve installed Test-Ball®
  - Sleeve installed Muni-Ball®
  - Sleeve installed Air-Loc®

Plug with sleeve installed

Pneumatic Plugs – Maintenance & Storage

CLEANING & INSPECTION

- Must be clean and inspected before and after every use
- Do not use if plug has or shows any signs of wear or deterioration
  - Cuts
  - Abrasions
  - Punctures
  - Bulges
  - Cracks
  - Corrosion
  - Leaks
  - Loose or damaged fittings / components



MAINTENANCE & STORAGE

- Clean with mild soap & water
- Store in a dry place away from sunlight or other sources of ultra-violet light and ozone.
  - Store below 110° F
  - Can be stored suspended vertically or placed horizontally

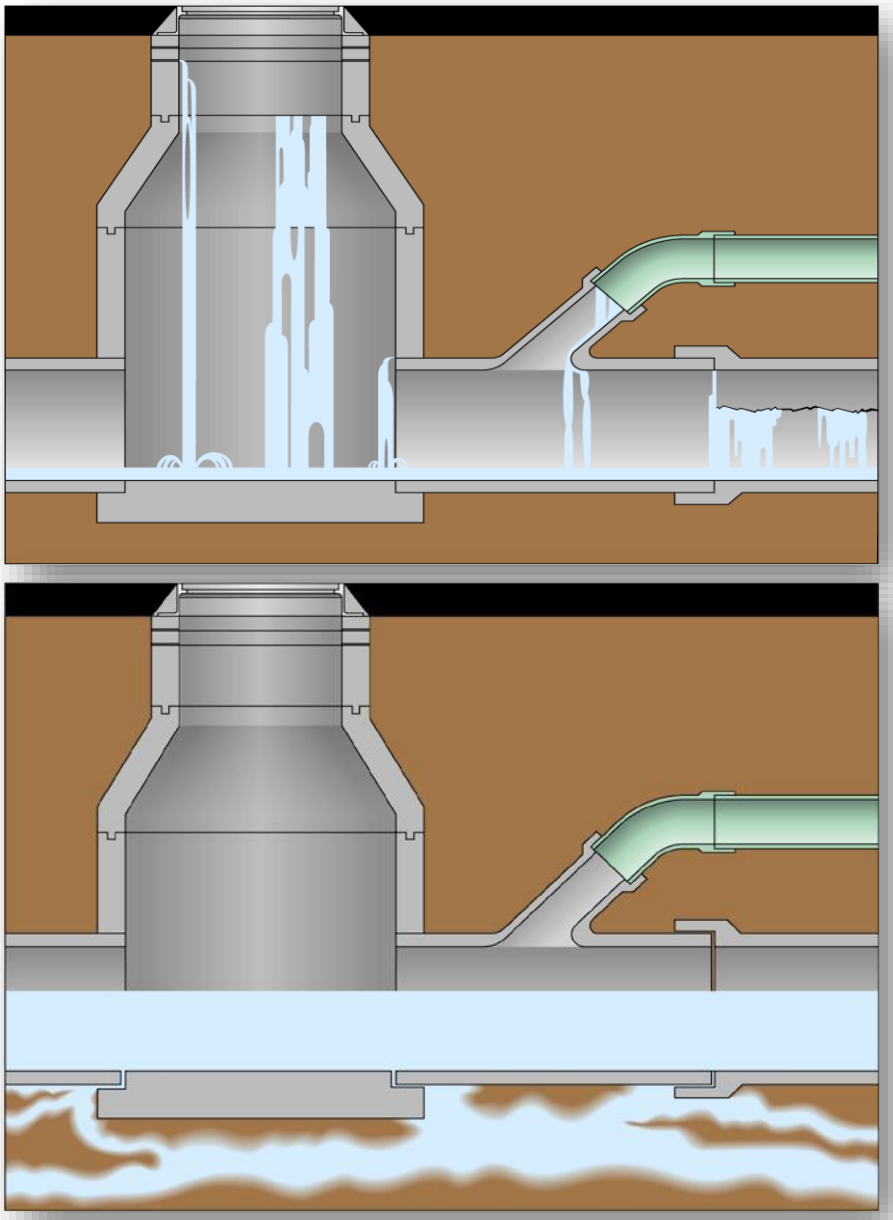
Testing Equipment – Why Test?

INFILTRATION

- Reduce or eliminate I&I
- Reduce Wastewater processing costs
- Repair
- Illegal tap ins
- Line Acceptance
- Asset Maintenance

EXFILTRATION

- Reduce Sanitary Sewer Overflow Events (SSO's)
- Safeguard groundwater and waterways
- Environmental Protection Agency (EPA)



Why Test With Water vs Air

Comment from Engineer to municipality requesting information about Air Testing vs Hydrostatic Testing.

"Chris asked me to comment on my opinion of pressure testing a watermain at 250 psi air pressure. My question to Chris was if he knew of someone that tried it and did they live to tell about it. I can't imagine anything more reckless or dangerous and I would have thought even an inexperienced contractor would have known better."

Case Study - A contractor was dewatering a 10 mile section after hydrostatic test. They were pushing a foam pig with air to displace the water. The pig got stuck somewhere and they began pressuring up the section to approx. 400 psig. The water was being removed from a 12" bypass line. They decided that the restriction was not allowing the pig to move freely so they opened the end of the temporary trap. At this point, the pig was seeing downstream pressure of ambient and upstream pressure of 400 psig. The differential force was almost 1/2 a million pounds. In order to "catch" the pig, a large front-end loader was placed in front of the open trap. Needless to say, the pig shot out of the trap, completely flipped the loader and continued to fly approximately 150 yards in the air, destroying a wooden platform along the way. The contractor did have the foresight to not have anyone in the path of the pig or there surely would have been fatalities.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Testing Equipment

WATERWORKS APPLICATIONS

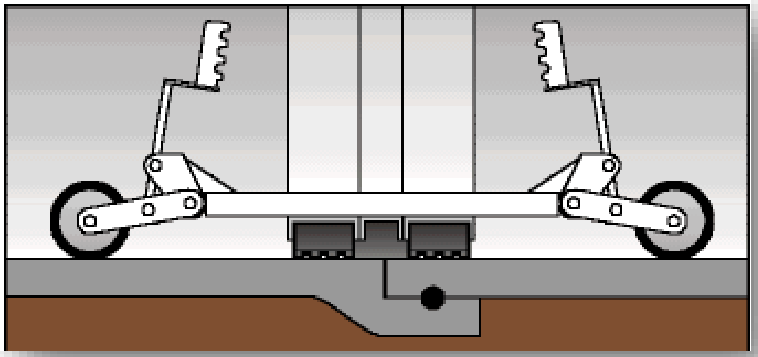
- Low Pressure Air Testing
- Low Pressure Joint Testing
- Vacuum Manhole Testing
- Deflection Testing
- Smoke Testing
- Hydrostatic Testing

Testing Equipment – Joint Testing

WATERWORKS APPLICATIONS

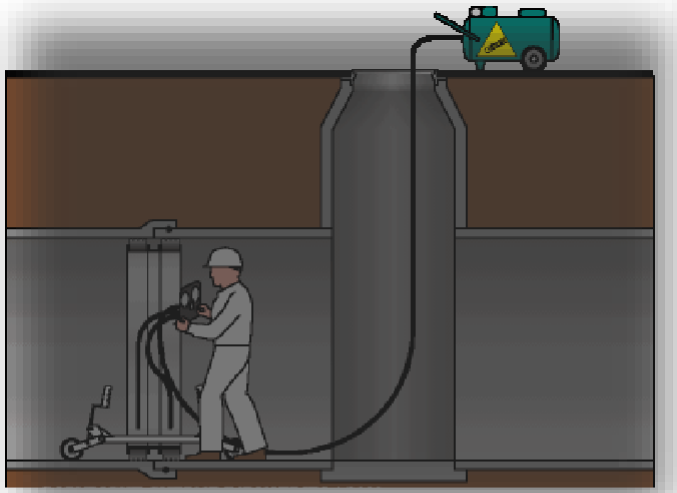
- Testing pipe joints
- ASTM C1103 (Concrete pipe)
- ASTM F3058 (Thermoplastic pipe)

JOINT TESTER VIDEO



END USERS

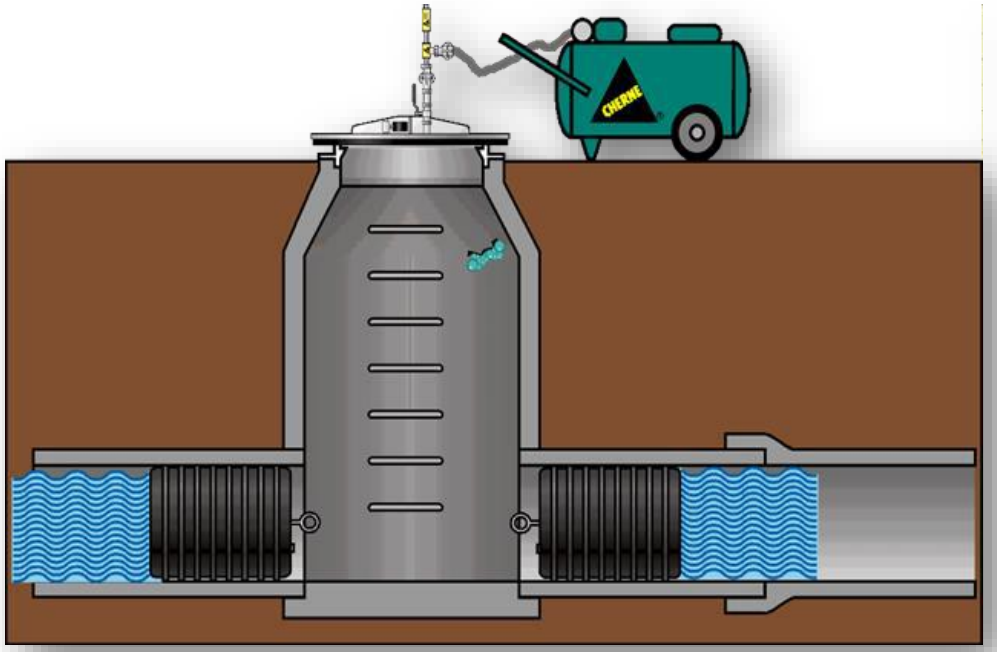
- Municipalities
- Contractors



Testing Equipment – Manhole Testing

WATERWORKS APPLICATIONS

- Testing manholes
- ASTM C1244



END USERS

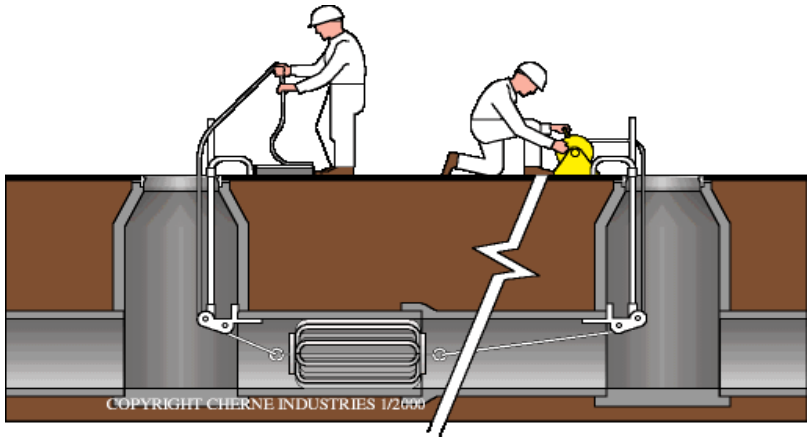
- Municipalities
- Contractors

Manhole Tester Video

Testing Equipment – Deflection Testing

WATERWORKS APPLICATIONS

- Test flexible pipe out of roundness (5%, 7.5%)
- ASTM D3034 (PVC pipe)
- ASTM F679 (Large PVC pipe)
- ASTM F949 (Corrugated pipe)



END USERS

- Municipalities
- Contractors

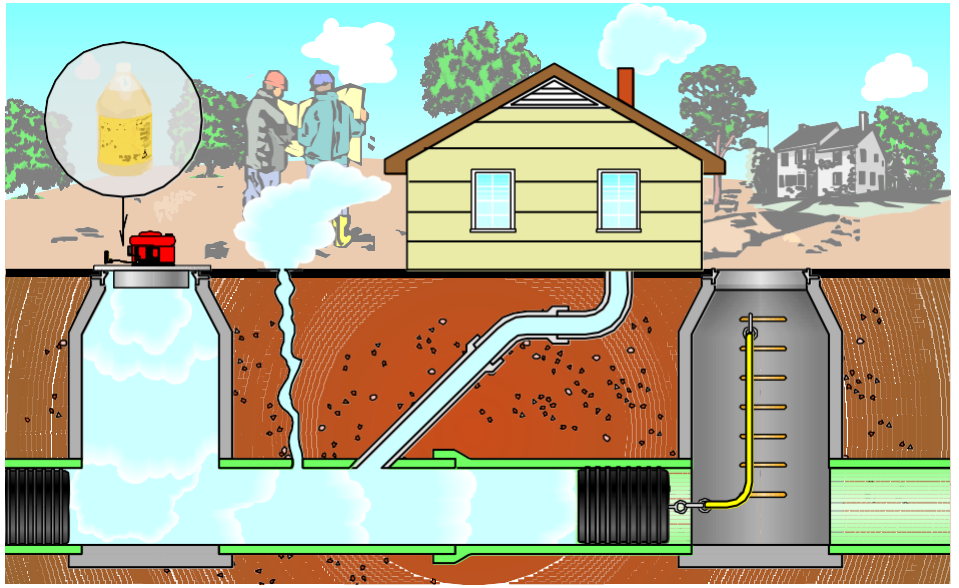
Line Stringing

Line Stringer Video

Testing Equipment – Smoke Testing

WATERWORKS APPLICATIONS

- Non ASTM test
- Sewer mapping
- Find sources of inflow or illegal tap into sewer line



END USERS

- Municipalities
- Contractors

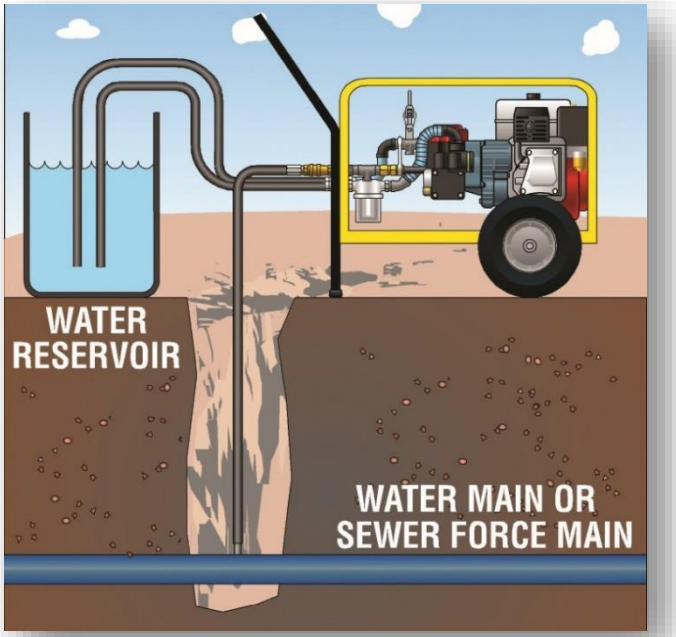
SMOKE TESTER VIDEO

Shutout Video

Testing Equipment – Hydrostatic Testing

WATERWORKS APPLICATIONS

- Water line testing
- Tested in accordance with American Waterworks Association (AWWA)
  - ≥ 150 psi
- Insures the integrity of newly installed or repaired water lines, valves and hydrants



END USERS

- Municipalities
- Contractors

HYDROSTATIC TESTING VIDEO

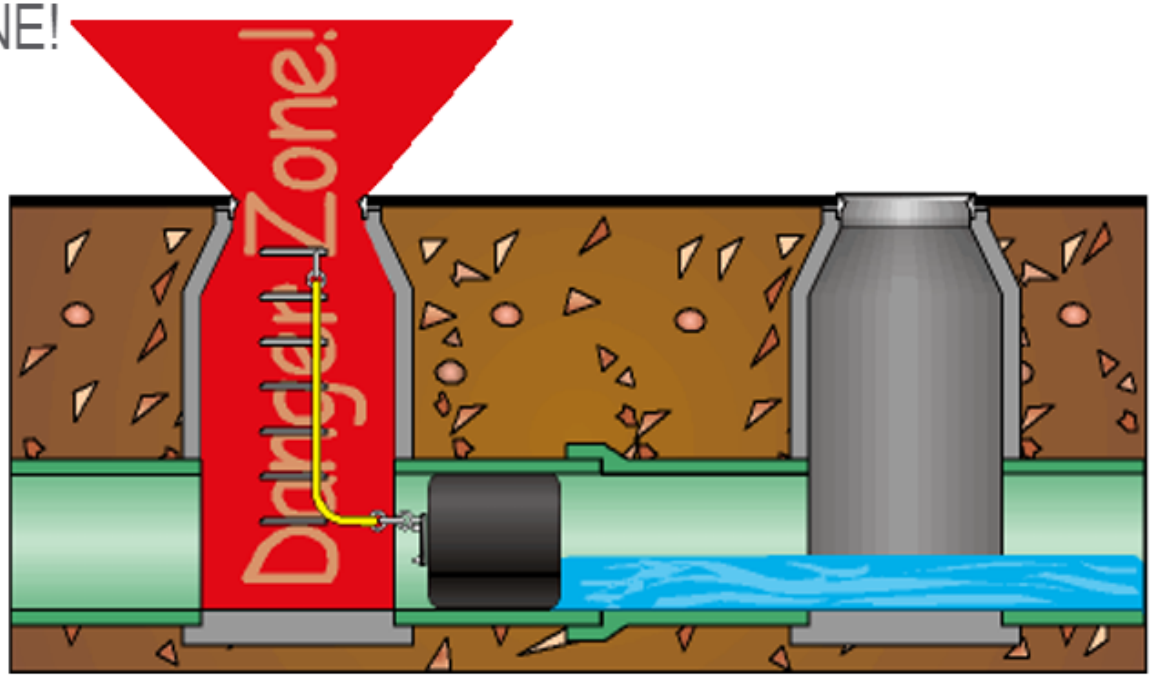
Safety Video

Safety Video

Pneumatic Plugs – Safety

One key rule: Stay out of Danger Zone

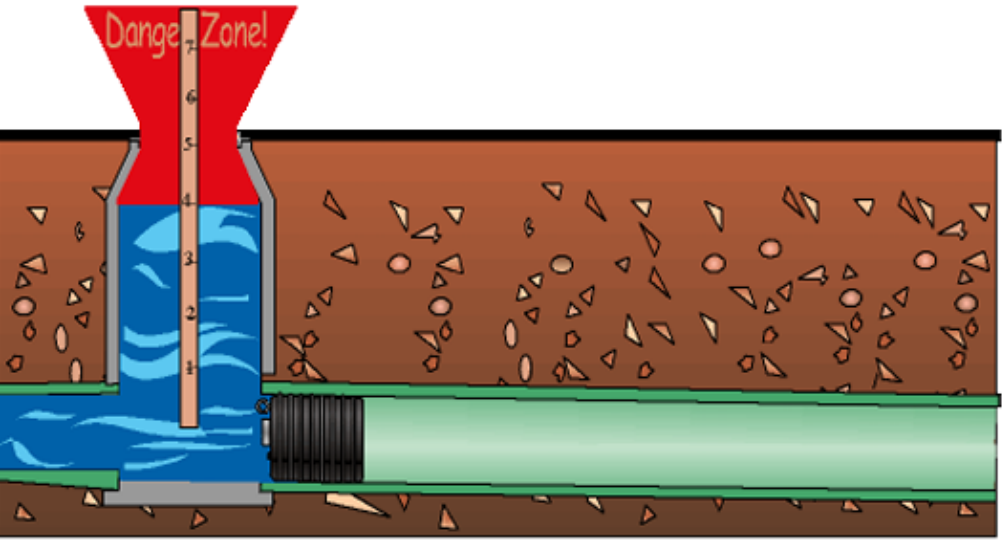
- Never inflate plug outside of pipe
- Always use calibrated gauge to monitor pressure
- Always use inflation hose to inflate plug
- Never stand in the DANGER ZONE!

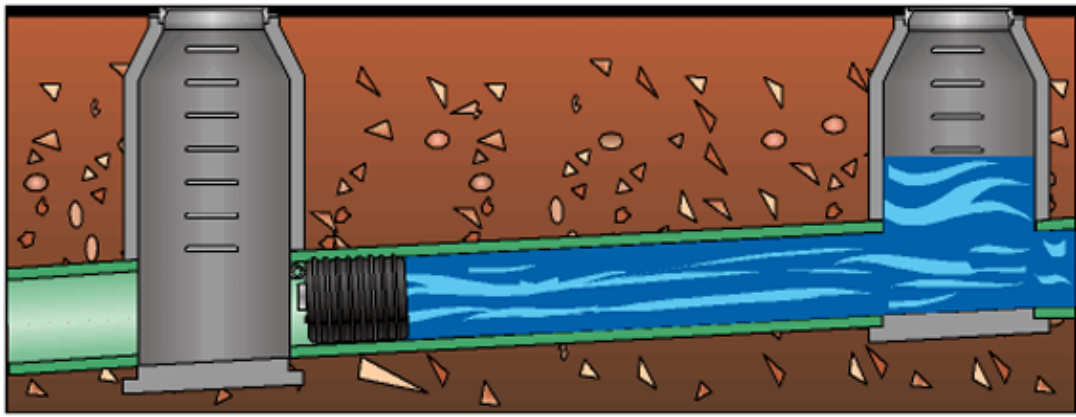


Pneumatic Plugs – Safety

FEET OF HEAD

Defined simply as height of water from centerline of plug.





Pneumatic Plugs – Safety

PSI =

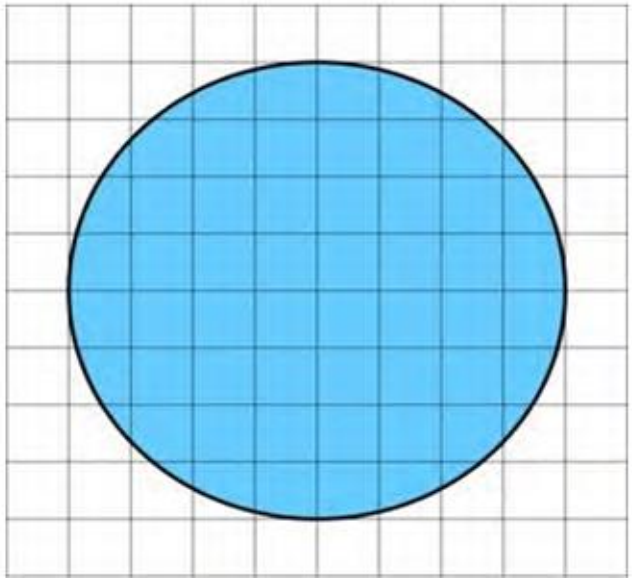
Pounds Per Square Inch

Square inches of a circle = Pi R^2

8" pipe =

4" X 4" X 3.14 = 50.24 square inches

24" X 24" X 3.14 = 1,808 square inches



Pneumatic Plugs - Safety

FORCE

- Amount of force being held by a pipe plug
  - Force = psi * Area of a circle
    $F = psi \times \pi r^2$ $\quad$ psi $= .433 \times ft\ hd$

- Example 1:
  - 60” diameter pipe with 7 psi back pressure
  - F = 7*3.14*30^2 = 19,782 lbs. of force

- Example 2:
  - 42” diameter pipe with 150 psi back pressure
  - F = 207, 711 lbs. of force

F150 truck weighing 4,000 lbs traveling at 55 mph hits a wall

F = 204,730 lbs. of force

Pneumatic Plugs - Safety

AIR VS WATER PRESSURE

- Both pressurized water and air can be dangerous

- Air is compressible. Water is not.
  - The release of compressed air can be extremely dangerous

Questions

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