

T N E M E T E C H



SUBJECT

Series 431 Perma-Shield® PL High-Velocity Jet Cleaning (Hydrocleaning)

PURPOSE

Guidelines For Sewer Cleaning Steel Or Ductile Iron Pipe Using High-Velocity Jetting Methods

GENERAL

Background:

A sanitary sewer collection system is a vital element of any community's infrastructure and a critical component of the wastewater treatment process. The proper operation and maintenance of collection system assets is critical to minimizing the frequency and volume of sanitary sewer overflows (SSOs). Series 431 Perma-Shield PL ceramic epoxy liner for ductile iron and steel sewer pipe allows for efficient cleaning and inspection of sewer systems—two integral parts of sewer maintenance.

Sewer cleaning is performed to remove blockages and prepare the lines for inspection. Blockages in sewers are often caused by an accumulation of material (e.g., fats, oil, grease, sediment) in the pipe. Additionally, accumulated solids in collection systems are known to increase the generation of hydrogen sulfide, a highly corrosive gas. Only when the pipe is sufficiently cleaned can it be inspected visually and evaluated for defects and other characteristics.

Accumulated material is commonly removed by hydraulic methods such as high-velocity jet sewer cleaning (also known as hydrocleaning). The EPA's proposed *Capacity, Management, Operations, and Maintenance* (CMOM) program provides guidelines for sewer cleaning, inspection and evaluation. The CMOM reference guide for utility operators states that hydraulic jetting "directs high velocities of water against pipe walls" and "removes debris and grease build-up." Series 431 Perma-Shield PL gives municipal owners various options for hydrocleaning that are compatible with CMOM techniques and common in today's municipal sewerage systems.

Proper cleaning methods aid sewer inspection by removing buildup in pipes. Series 431 Perma-Shield PL further facilitates visual inspection methods (e.g., lamping, camera inspection and CCTV) because of its reflective light green color. The color, "Sewer Pipe Green," causes defects to be much more apparent than they would be in pipe lined with a black coating.

Series 431 Perma-Shield PL Hydrocleaning Guidelines:

1. The cleaning nozzles shall be a minimum of 2 in (50 mm) standoff from the pipe surface.
2. The water pressure at the jet nozzles shall be no more than 2,500 psi (172 bar) and a maximum of 80 gallons per minute (302 Lpm).
3. The cleaning jet nozzles (fixed) shall be no greater than a 30 degree angle of incidence to the pipe wall and up to 90 degree angle of incidence nozzles for rotational or spinner nozzles.
4. The cleaning nozzle assembly should continually move when sewer cleaning. The stationary time (hold time) shall be no more than 60 seconds for up to 30 degree nozzles.
5. The nozzle assembly shall have non-abrasive wheels or skids positioned so that at no time does the nozzle assembly contact the lining of the pipe.
6. All sewer hoses, hose couplings, etc., shall be smooth so as to facilitate movement across the pipe joints without creating damage to the lining. Use hose protectors and guide or roller assemblies as recommended by the manufacturer.
7. Do not use root cutters, saws or chain scraper nozzles.
8. Follow NASSCO *Jetter Code of Practice*, May 2006.

Nozzle Testing:

Various high-velocity jetting nozzles were tested with Series 431.

Although not comprehensive, this list represents the types of jetting nozzles that are suitable for cleaning Series 431 lined pipe.

The following products are manufactured by Shamrock Pipe Tools, Inc.®

- Radial Short (30°)
- Radial Vortex (24°)
- Universal Penetrator (20°)
- Ultimate Penetrator (15°)
- Radial C (carbide) (30°)
- Shamrock-et® (5°)
- Grease (30°)
- Cobia® (20°)
- Tadpole® (14°)
- Rear Rotating Combi (RRC) Blaster™ (40°, 90°)

Other commercially-available pipe-cleaning nozzles may also be suitable for use as long as they meet the specifications of the products listed above. Please contact manufacturer for offset recommendations.

Conclusion:

Series 431 Perma-Shield PL has been tested and found to be compatible with various tools commonly used for hydraulic jet cleaning. Municipalities using Series 431-lined ductile iron or steel pipe can confidently employ high-velocity jet cleaning using recommended cleaning tools. Pipes that are free of buildup and coated with a reflective light green color will allow for a more effective inspection. By routinely cleaning and inspecting their sewer systems with modern methods, municipalities can better support and maintain their vital infrastructure and ensure its sustainability.



Fig. 1: Some of the pipe cleaning tools tested on Series 431 lined DIP.

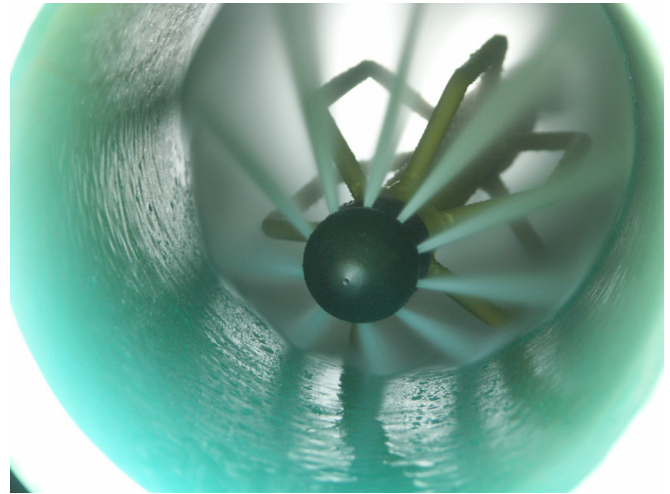


Fig. 2: Testing of nozzle designed for heavy-duty sludge and debris removal.

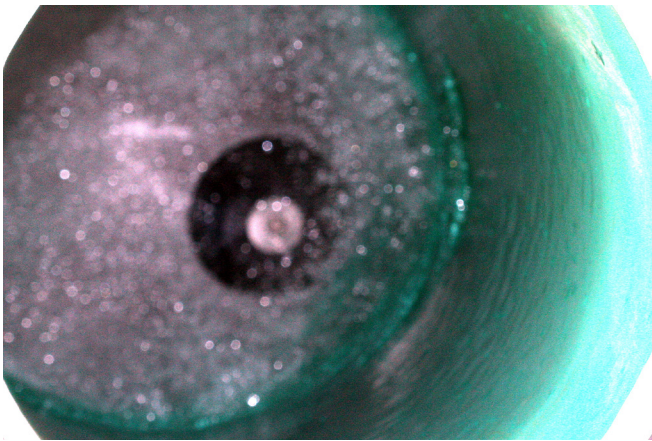


Fig. 3: Testing of self-rotating and thrusting nozzle used to clear sidewall sludge and debris.

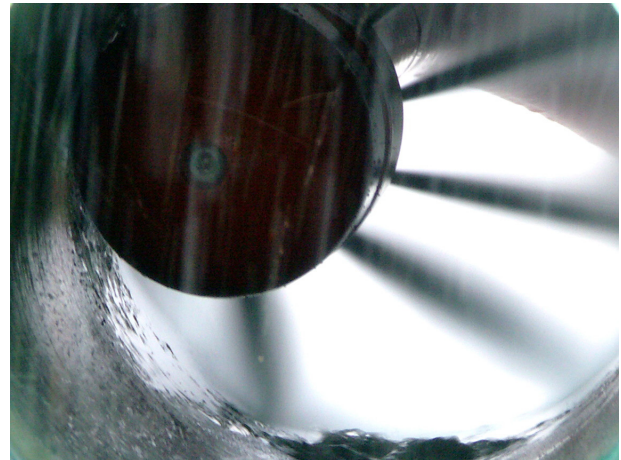


Fig. 4: Testing of nozzle intended for sludge, mud and debris flushing.