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Standard Practice for Cleaning of Thermoplastic Solid Wall Sanitary Sewer Pipelines¹

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1. Scope

1.1 This practice covers the personnel requirements, operator training, Environmental Protection Agency (EPA) Guidelines, operating procedures, and recommended equipment performance/design for the proper operation of pressure water-jet cleaning and cutting equipment as normally used by municipalities and contractors concerned with operations, maintenance, and cleaning work of Municipal Thermoplastic gravity sewer pipe.

1.2 The term *high-pressure water jetting* within this practice covers all water jetting, including the use of jets and hydro mechanical tooling at pressures below 2000 psi (0.69 MPa).

1.3 This practice covers the *high-pressure water jetting* of Thermoplastic pipe and should not be applied to other pipe and pipe-lining materials without evaluating the recommended cleaning procedure from the pipe manufacturer to avoid damage.

1.4 This practice applies to High-Density Polyethylene, Polypropylene, and Polyvinyl Chloride (HDPE, PP, and PVC) Thermoplastic sewer pipe manufactured in accordance with ASTM Standards. It may also be considered for use for any similar thermoplastic pipe products not covered by this list but with similar performance characteristics.

1.5 The values stated in inch-pound units are to be regarded as standard. The values given in parentheses are mathematical conversions to SI units that are provided for information only and are not considered standard.

1.6 *This standard does not purport to address all of the safety concerns, if any, associated with its use. It is the responsibility of the user of this standard to establish appropriate safety, health, and environmental practices and determine the applicability of regulatory limitations prior to use. Some specific hazards statements are given in Section 5 on Hazards/Safety.*

¹ This practice is under the jurisdiction of ASTM Committee F36 on Technology and Underground Utilities and is the direct responsibility of Subcommittee F36.20 on Inspection and Renewal of Water and Wastewater Infrastructure.

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1.7 *This international standard was developed in accordance with internationally recognized principles on standardization established in the Decision on Principles for the Development of International Standards, Guides and Recommendations issued by the World Trade Organization Technical Barriers to Trade (TBT) Committee.*

2. Referenced Documents

2.1 *CDC Standard:*²

[Guidance for Reducing Health Risks to Workers Handling Human Waste or Sewage](#)

2.2 *Federal Standards:*

[DOT CFR 49 Parts 106–107, 171–180, and 390–397 HAZMAT Transportation Regulations for Domestic Shipping and Transporting of Hazardous Materials](#)³

[OSHA Public Law 91-596 Section 5](#)⁴

[OSHA 29 USC 654 Duties of Employers and Employees](#)⁴
[29 CFR 1910.120 Hazardous waste operations and emergency response](#)³

[US EPA Optimizing Operation, Maintenance, and Rehabilitation of Sanitary Sewer Collection Systems](#)⁵

3. Terminology

3.1 *Definitions:*

3.1.1 *boom, n*—telescopic vacuum tube mounted on a sewer-cleaning truck chassis.

3.1.2 *bucket, n*—a special device designed to be pulled along a sewer for the removal of debris from the sewer.

3.1.2.1 *Discussion*—The bucket has one end open with the opposite end having a set of jaws. When pulled from the jaw end, the jaws are automatically opened. When pulled from the other end, the jaws close. In operation, the bucket is pulled into

² Available from Centers for Disease Control and Prevention (CDC), 1600 Clifton Rd., Atlanta, GA 30329-4027, <http://www.cdc.gov>.

³ Available from U.S. Government Publishing Office (GPO), 732 N. Capitol St., NW, Washington, DC 20401, <http://www.gpo.gov>.

⁴ Available from Occupational Safety and Health Administration (OSHA), 200 Constitution Ave., NW, Washington, DC 20210, <http://www.osha.gov>.

⁵ Available from United States Environmental Protection Agency (EPA), William Jefferson Clinton Bldg., 1200 Pennsylvania Ave., NW, Washington, DC 20460, <http://www.epa.gov>.

the debris from the jaw end and to a point where some of the debris has been forced into the bucket. The bucket is then pulled out of the sewer from the other end, causing the jaws to close and retain the debris. Once removed from the manhole, the bucket is emptied and the process repeated.

3.1.3 *bucket (machine) cleaning, n*—a powered winch machine designed for operation over a manhole. The machine controls the travel of buckets used to clean sewers.

3.1.4 *high-velocity sewer cleaner, n*—these portable units have the capability of generating variable water pressures and flow through a hose.

3.1.5 *high-velocity sewer cleaning, n*—best described as a hydraulic cleaning method that utilizes water pressure to remove obstructions and deposits in sewers or storm drains.

3.1.6 *hose guide, n*—protects the sewer hose from abrasion and chafing damage.

3.1.6.1 *Discussion*—Commonly referred to as *Tiger Tail*.

3.1.7 *hydro-mechanical tooling, n*—mechanical devices in which water is employed to power rotational cleaning to the inside of a sewer pipe.

3.1.8 *jets, n*—sewer nozzle jets are manufactured from different materials and jet orifice sizes to allow for the calibration of the water flow and pressure exiting the nozzle.

3.1.9 *mechanical sewer cleaning, v*—clearing pipe by using equipment that scrapes, cuts, pulls, or pushes the material out of the pipe.

3.1.9.1 *Discussion*—Mechanical cleaning devices or machines include bucket machines, power rodders, and hand rods.

3.1.10 *nozzles, n*—primarily used to deliver water streams to the entire internal circumference of sewer pipes to clean, flush, and remove deposits.

3.1.11 *power rodders, n*—a sewer-cleaning machine fitted with auger rods that are inserted in a sewer line to dislodge and remove debris.

3.1.12 *water jetting, n*—see *high-velocity sewer cleaning*.

4. Significance and Use

4.1 Hydraulic cleaning methods include equipment that uses water and water velocity to clean the invert and walls of Thermoplastic Sewer Pipe.

4.2 The practice of high-velocity sewer cleaning is best described as a hydraulic cleaning method that uses water pressure to remove obstructions and deposits in sewers or storm drains.

4.3 There are different configurations of high-velocity sewer-cleaning machines. These units can generate variable water pressures up to 5000 psi (34 MPa) and variable flow rates of 50 gal per min (gpm) to 125 gal per min (gpm) (180 L per min to 473 L per min).

4.4 The water tank capacity on these units varies from 1000 gal to 1500 gal (3785 L to 5678 L).

4.5 The hose lengths vary between 500 ft and 1000 ft (152 m and 305 m) in length with a diameter of $\frac{3}{4}$ in. to $1\frac{1}{4}$ in. NPT.

4.6 There are a number of different nozzles and tools that may be used during the cleaning process.

4.7 Some high-velocity sewer cleaners have a vacuum conveyance system that uses large fans or positive displacement vacuum pumps for material removal capabilities. With this type of system, material can be vacuumed from the manhole into a debris tank as it is brought back with the jet or tool and taken to a disposal area. These systems can be either trailer- or truck-mounted and are generally known as combination machines.

4.8 The Occupational Safety and Health Administration (OSHA) has set guidelines for the safe removal of hazardous and nonhazardous substances as stated in OSHA Section 5 of Public Law 91-596; OSHA 29 USC 654; 29 CFR 1910.120; as well as DOT CFR 49 Parts 106–107, 171–180, and 390–397.

5. Hazards/Safety

5.1 See 4.8, 7.3, 7.4, and Section 5 for specific hazards statements.

5.2 It is the responsibility of every employee to ensure that all applicable safety rules and regulations are adhered to during the performance of their duties.

5.3 As a general rule, every employee is responsible to ensure that all activities are performed in a safe manner and, if the work cannot be performed safely, then it is not to be performed.

5.4 The following items are minimum activities required to mitigate the hazards that may be encountered during the high-velocity sewer-cleaning process.

5.4.1 *Personal Protective Equipment (PPE):*

5.4.1.1 The high-velocity cleaning crew shall be periodically trained in the use of PPE, and they should use that equipment, as necessary, to protect themselves from hazards that may be encountered from human waste or sewage. It is essential that this equipment is inspected and maintained on a periodic basis.

5.4.1.2 Additionally, supervisors and safety personnel should ensure that sewer-cleaning activities are being safely performed in a manner consistent with the applicable state, local, and federal policies and regulations.

5.4.1.3 The Centers for Disease Control and Prevention (CDC) Guidance for Reducing Health Risks to Workers Handling Human Waste or Sewage states, “Workers handling human waste or sewage should be provided proper PPE, training on how to use it, and hand washing facilities. Workers should wash hands with soap and water *immediately after* removing PPE. The following PPE is recommended for workers handling human waste or sewage:

(1) Goggles to protect eyes from splashes of human waste or sewage,

(2) Protective face mask or splash-proof face shield to protect nose and mouth from splashes of human waste or sewage,

(3) Liquid-repellent coveralls to keep human waste or sewage off clothing,

(4) Waterproof gloves to prevent exposure to human waste or sewage, and

(5) Rubber boots to prevent exposure to human waste or sewage.”

5.4.2 *Traffic Safety:*

5.4.2.1 Traffic control requirements may vary depending on the location and safety risk to operating personnel and the public.

5.4.2.2 All traffic control shall conform and be safely performed in a manner consistent with the applicable state, local, and federal policies and regulations.

5.4.2.3 OSHA states “There must be a traffic control plan for the movement of vehicles in areas where there are also workers conducting other tasks. Drivers, workers on foot, and pedestrians must be able to see and understand the routes they are to follow.”

5.4.3 *Maintenance Hole (MH) Safety*—Before any persons enter a confined space, all confined space procedures shall be followed as outlined. In addition, all open maintenance holes shall be guarded (an attendant shall be present or a mechanical barrier shall be in place).

5.4.4 *Personal Hygiene*—All operating personnel shall observe good hygiene practices. Each vehicle shall be equipped with cleaning materials and first aid supplies. Areas where food or clothing is stored shall be kept clean to avoid the possibility of cross-contamination.

5.4.5 *Lockout/Tagout*—Remember that rotating shafts and charged pressure systems can cause serious injury or death. All moving parts and sources of energy shall be locked out and tagged out before anyone works on the vehicle. Refer to the division’s lockout/tagout policy for specific instructions for each type of equipment.

6. Pre-operations Procedures

6.1 Any person required to operate or maintain pressure water-jetting equipment, nozzles, and hydromechanical tooling shall have been trained and have demonstrated the ability and knowledge to do so in accordance with the original equipment manufacturer’s instructions, specifications, and training programs.

6.2 All equipment, tooling, or the vehicle, or combinations thereof, shall be inspected at the start of each working day to ensure that the equipment is in safe working order.

6.3 Ensure that an approved dump facility is available to dispose of debris recovered during the cleaning process.

7. Operational Procedures

7.1 The standard operational procedure of high-velocity cleaning of Thermoplastic Sewer Pipe is to safely remove all obstructions and deposits from the pipeline and restore the pipe to a minimum of 95 % of operational design capacity. The basics of this procedure may be used for other types of sewer cleaning and inspection.

7.2 The crew shall locate the structures where the cleaning is to be performed.

7.3 The crew shall place all required safety and traffic control devices as needed.

7.4 A black sewer leader hose shall be attached at the end of the colored hydro hose in conjunction with a hose guide sleeve

to protect the hose from abrasion and chafing damage. The black leader hose also warns the operator when the end of the hose is approaching the maintenance hole structure.

7.5 Properly position the hose reel in line with the pipe to be cleaned.

7.6 The crew shall install a debris trap or a vacuum tube in the downstream MH outlet.

7.7 If safety permits, open the upstream MH during the cleaning process to prevent air being forced up a lateral pipe that is connected to the pipe that is being cleaned.

7.8 The nozzle shall be attached to a wired legged proofing skid (or centralizer) calibrated to 95 % of the operational capacity of the pipe, and to keep the proper nozzle standoff distance from the pipe wall. The proofing skid will act as a Go/No Go gauge to indicate that the pipe has been cleaned to proper operational capacity as it travels through the sewer during the cleaning process.

7.9 Place the hose, nozzle, and skid into the pipe a minimum of 3 ft (0.9 m) before engaging the pump to deliver pressurized water to the nozzle or cleaning tool. The pressurized water should not exceed 1740 psi (24 MPa) at 31 gal per min (gpm) (120 L per min) at the nozzle, and the nozzle should have no less than a 1 in. (25 mm) impingement standoff distance from the wall of the pipe.

7.10 The initial cleaning pass should be 50 ft to 100 ft (15 m to 30.5 m) traveling upstream. Depending on the results, you may need to change the nozzle and repeat the cleaning process or continue to clean the entire pipe. The nozzle shall not exceed 60 s in a stationary position.

7.11 The crew shall visually verify the cleaning equipment has traveled from MH to MH.

7.12 If the crew is unable to verify 95 % capacity on the first attempt, the crew shall check for excessive pipe deflection or change the nozzle/tool and remove the obstruction(s) in the line.

7.13 The crew shall remove all debris that has been collected in the trap.

7.14 The crew shall remove all traffic/safety control devices and clean the work area.

7.15 The crew leader shall complete the work order and report any pipeline anomalies found.

7.16 To ensure the proper operation and maintenance of a wastewater collection system, it is essential that accurate records be maintained. It is imperative that all wastewater crews accurately report all work accomplished, especially the condition of the maintenance hole, the structures, and pipeline before and after cleaning. This information is vital when not only determining the optimal maintenance interval for a specific pipeline asset, but also for staffing and budgetary purposes as well as Federal regulatory requirements.

8. Sewer-cleaning Nozzles for Thermoplastic Pipe

8.1 Static (non-rotational) shall be utilized when cleaning Thermoplastic Pipe and are available with a wide range of jet angles and are manufactured in a variety of sizes and shapes.