



Designation: C1920 – 23

Standard Practice for Cleaning of Vitrified Clay Sanitary Sewer Pipelines¹

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1. Scope

1.1 This practice covers the personnel requirements, operator training, 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 tasked with operations, maintenance, cleaning, and pre-rehabilitation cleaning work of vitrified clay mainline sewer pipe.

1.2 The term “high-pressure water jetting” covers all water jetting, including the use of jets and hydromechanical tooling at pressures above 2000 psig (0.69 MPa).

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

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

1.5 *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.*

1.6 *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](#)

¹ This test method is under the jurisdiction of ASTM Committee C04 on Vitrified Clay Pipe and is the direct responsibility of Subcommittee C04.20 on Methods of Test and Specifications.

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

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
[Vitrified Clay Pipe Engineering Manual, 2017](#)⁶
[Vitrified Clay Pipe Operations & Maintenance Handbook, 2020](#)⁶

3. Terminology

3.1 Definitions:

3.1.1 *high velocity sewer cleaner, n*—these portable units have the capability of generating variable water pressures through a hose up to 3500 psi (24 MPa) and variable flow rates of 50-125 gal per min (gpm) (180-473 L per min).

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

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

3.1.3.1 *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 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 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>.

⁶ Available from National Clay Pipe Institute, 850 N. Wisconsin St., Ste 102, Elkhorn, WI 53121, <https://www.ncpi.org>.

3.1.4 *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

3.1.5 *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.

3.1.6 *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.

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

3.1.7.1 *Discussion*—Commonly referred to as “Tiger Tail.”

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

3.1.9 *mechanical sewer cleaning, n*—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 which 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 the vitrified clay 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 have the capability of generating variable water pressures up to 3500 psi (24 MPa) and variable flow rates of 50-125 gal per min (gpm) (180-473 L per min).

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

4.5 The hose lengths vary between 500 and 1000 ft (152 and 305 m) in length with a diameter of ¾ - 1¼ in. NPT.

4.6 There are 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 use 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 Parts 106-7, 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 Center 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.