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Standard Guide for Installing Asbestos-Cement Nonpressure Pipe[1]

This standard is issued under the fixed designation C966; the number immediately following the designation indicates the year of original adoption or, in the case of revision, the year of last revision. A number in parentheses indicates the year of last reapproval. A superscript epsilon (ε) indicates an editorial change since the last revision or reapproval.

This standard has been approved for use by agencies of the U.S. Department of Defense.

1. Scope

1.1 This guide covers the methods of installing asbestos-cement (A-C) nonpressure sewer and storm drain pipe and fittings covered by Specification C428 and Specification C663 to utilize the material's performance properties to the fullest advantage. Included are recommendations and directives for storing, handling, and transporting pipe, trench excavation, pipe embedment, recommended work practices, assembly and installation, backfill placement, and field testing of installed pipe and fittings in pipelines.

1.2 The values stated in SI units are to be regarded as standard. The values stated in parentheses are provided for information only.

1.3 **Warning—**Breathing of asbestos dust is hazardous. Asbestos and asbestos products present demonstrated health risks for users and for those with whom they come into contact. In addition to other precautions, when working with asbestos-cement products, minimize the dust that results. For information on the safe use of chrysotile asbestos, refer to "Safe Use of Chrysotile: A Manual on Preventive and Control Measures."[2]

1.4 *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 and health practices and determine the applicability of regulatory limitations prior to use.*

2. Referenced Documents

2.1 This guide references the following documents. They form a part of this guide to the extent specified herein. In any case of conflict, the directives of this guide shall prevail.

2.2 *ASTM Standards:*[3]

C428 Specification for Asbestos-Cement Nonpressure Sewer Pipe

C663 Specification for Asbestos-Cement Storm Drain Pipe

D1869 Specification for Rubber Rings for Asbestos-Cement Pipe

D2946 Terminology for Asbestos and Asbestos–Cement Products

2.3 *ANSI Standard:*[4]

C 111 Rubber Gasket Joints for Cast Iron and Ductile Iron Pipe and Fittings

2.4 *Other Standards:*

AASHTO T-99: Method of Test for Moisture-Density Relationships for Soils[5]

AWWA M-16: Work Practice for Asbestos-Cement Pipe[6]

AWWA A21.11: Rubber Gasket Joints for Cast Iron and Ductile Iron, Pipe, and Fittings[6]

OSHA: Construction Standards and Regulations, U.S. Dept. of Labor, Occupational Safety and Health Administration[7]

WPCF FD-5 Manual Practice No. 60 ASCE Manuals and Reports on Engineering Practice[8]

Method T-99 Compaction and Density of Soils[5]

3. Terminology

3.1 *Definitions:*

[1] This guide is under the jurisdiction of ASTM Committee C17 on Fiber-Reinforced Cement Products and is the direct responsibility of Subcommittee C17.03 on Asbestos - Cement Sheet Products and Accessories.

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[2] Available from The Asbestos Institute, http://www.chrysotile.com/en/sr_use/manual.htm.

[3] For referenced ASTM standards, visit the ASTM website, www.astm.org, or contact ASTM Customer Service at service@astm.org. For *Annual Book of ASTM Standards* volume information, refer to the standard's Document Summary page on the ASTM website.

[4] Available from American National Standards Institute (ANSI), 25 W. 43rd St., 4th Floor, New York, NY 10036, http://www.ansi.org.

[5] Available from American Association of State Highway and Transportation Officials (AASHTO), 444 N. Capitol St., NW, Suite 249, Washington, DC 20001, http://www.transportation.org.

[6] Available from American Water Works Association (AWWA), 6666 W. Quincy Ave., Denver, CO 80235, http://www.awwa.org.

[7] OSHA Construction Standards and Regulations, available from U.S. Dept. of Labor, Occupational Safety and Health Administration.

[8] Available from Water Pollution Control Federation, 2626 Pennsylvania Ave. NW, Washington, DC 20037.

3.1.1 Refer to Terminology D2946 for additional definitions.

3.1.2 *compacted backfill*—backfill material that has been compacted to a density as specified by the engineer.

3.1.3 *constructor, n*—the party that furnishes the work and materials for placement or installation.

3.1.4 *crushing strength, n— for pipes*, a property of solid material that indicates its ability to withstand collapse from external, compressive loads.

3.1.5 *engineer, n*—the person, firm, corporation or government agency acting for the purchaser as a duly authorized agent in the designing and engineering of the project.

3.1.6 *fitting, n—for pipes*, component such as wyes, tees and adaptors for use in laying asbestos-cement pipe, such that, when properly installed, yields an assembly equivalent in serviceability and strength to the pipe sections.

3.1.7 *inspector, n—in pipe laying*, an authorized representative of the engineer, or purchaser, assigned to make any inspections of the work performed, including materials and equipment furnished.

3.1.8 *lot, n—in asbestos-cement nonpressure sewer pipe*, for pipe sizes 150 mm (6 in.) and smaller, those lengths of pipe of that size, class, and type manufactured during the same work shift. For pipe sizes 200 mm (8 in.) through 525 mm (21 in.), each 300 lengths of pipe or less, of identical size, class, and type manufactured on each machine during a 24-h period. For pipe sizes larger than 525 mm (21 in.) each 300 lengths of pipe or less, of identical size, class, and type manufactured on each machine during a period of consecutive working days not exceeding 7 days.

3.1.9 *lot, n—in asbestos-cement storm drain pipe*, for pipe sizes 525 mm (21 in.) in diameter and smaller, each 300 lengths of pipe or less, of identical class and size manufactured on each machine during a 24-h period. For pipe larger than 525 mm (21 in.), each 300 lengths of pipe or less, of identical class and size manufactured on each machine during a period of consecutive working days not exceeding 7 days.

3.1.10 *manufacturer, n*—the party that manufactures, fabricates, or produces materials or products.

3.1.11 *package unit, n—in pipe laying*, several units of asbestos-cement pipe bound together for the purpose of being transported and, when desired, unloaded at the job site.

3.1.12 *plans and specifications, n—in pipe laying*, documents prepared by the engineer or purchaser, or both, stipulating work to be done and materials to be used which, combined with other contract documents and this guide, form the basis for a comprehensive contract between the purchaser and the constructor.

3.1.13 *purchaser, n*—the person, company or organization that purchases any materials or work to be performed.

3.1.14 *supplier, n*—the party who supplies material or services. A supplier may or may not be the manufacturer.

4. Significance and Use

4.1 This guide is not intended to supply design information nor to assume the responsibility of the engineer in establishing procedures to attain satisfactory performance best suited to individual job conditions. A review of this guide is recommended prior to supplementing it, as appropriate, with the conditions and requirements of the owner and engineer.

5. Material Selection, Acceptance, Storage and Handling

5.1 *Acceptance:*

5.1.1 *Rejection of Damaged or Defective Pipe*—At the time of delivery, all material shall be examined for defects and damage. Any material that is defective or damaged shall be rejected and removed from the job site.

5.1.2 *Replacement of Damaged Pipe*—Material that is supplied by the purchaser and rejected at the point of delivery because of defects or damage shall be replaced by the purchaser. Material that is supplied by the contractor and rejected at the point of delivery because of defects or damage shall be replaced by the constructor. Material damaged after acceptance by the constructor shall be replaced by the constructor.

5.2 *Storage*—Safe storage shall be provided for all material until it has been incorporated into the completed project. The interior of all pipe, couplings, rings, fittings, and other accessories shall be kept free from dirt and other foreign matter at all times. Fittings shall be drained and stored in a manner that will keep them from damage by freezing.

5.3 *Handling*—At all times material shall be handled with care to avoid damage. Whether moved by hand, skidways, or hoists, material shall not be dropped, bumped, or allowed to impact on itself.

5.4 *Rehandling*—All materials which are to be supplied by the purchaser shall be claimed at the locations designated in the purchaser's specifications and hauled to and distributed at the work site by the constructor.

5.5 *Unloading at Work Site*—When distributing the material at the work site, it shall be unloaded adjacent to or near the location where it is to be installed.

6. General and Detailed Work to be Performed

6.1 *Alignment and Grade*—All pipe shall be laid to and maintained at the lines and grades required by the purchaser. Fittings shall be installed at the required locations with joints centered and plumb. No deviation shall be made from the required line or grade without the approval of the purchaser or the purchaser's agent.

6.2 *Excavation and Preparation of Trench:*

6.2.1 The trench shall be excavated to the required alignment and depth shown on the purchaser's drawings or as subsequently approved in writing by the purchaser, and only so far in advance of pipe laying as permitted by the purchaser's specifications.

6.2.2 *Excavation Methods*—When necessary to prevent caving, trench excavations shall be sheeted and braced or sloped according to applicable laws and ordinances. When sheeting and bracing are used, the trench width shall not be less than that specified in 6.2.3. As backfill is placed and sheeting is withdrawn, it shall be withdrawn vertically in increments of not more than 0.3 m (1 ft), and the void left by the withdrawn

sheeting shall be filled and compacted before withdrawing the next increment. All excavated material shall be piled in a manner that will not endanger the work or obstruct sidewalks and driveways. Gutters shall be kept clear or other provisions made for surface drainage.

6.2.3 *Trench Width*—The trench width shall be ampled to permit the pipe to be laid and jointed properly and the backfill to be placed and compacted as specified by the purchaser. Trenches shall be of such extra width, when required, to permit the convenient placing of timber supports and sheeting and bracing, as well as the handling of specials.

6.2.4 *Trench Preparation*—The trench shall be prepared for the direct placement of the pipe. This preparation includes digging coupling holes in the trench bottom or bedding, or placing properly prepared mounds as specified by the purchaser. (Illustrations of the various bedding conditions are presented in AWWA Standards C401 and C403, and also in ANSI Standards C401 and C403.)

6.2.5 *Excavation in Poor Soil and Refilling to Grade*—Any part of the trench excavated below grade shall be backfilled to grade with thoroughly compacted material approved by the purchaser. When an unstable subgrade condition is encountered and, in the opinion of the purchaser, it cannot support the pipe, an additional depth shall be excavated and refilled to pipe foundation grade with crushed stone or other suitable material as required by the purchaser to achieve a satisfactory trench bottom.

6.2.6 Pipe laid on trench bottom or bedding. Before the pipe is lowered into the trench, the constructor shall:

6.2.6.1 Excavate a coupling hole having sufficient length, width, and depth to permit assembly and provide a minimum clearance of 50 mm (2 in.) below the coupling, and

6.2.6.2 Provide the pipe with continuous support between coupling holes.

NOTE 1—Use of granular material for bedding is recommended as a preferred method of preparing the trench bottom for pipe installation.

6.2.7 *Pipe Laid on Earth Mounds*—Pipe shall be laid on earth mounds of backfill material compacted firmly in place and of a size adequate to hold the pipe in alignment and to maintain a 50 mm (2 in.) minimum clearance from coupling to trench bottom. Each pipe shall be laid on two mounds with the centre of each mound placed approximately one fifth of the pipe length from each end. The trench shall be excavated a minimum of 50 mm (2 in.) below the grade of the bottom of the outside diameter of the coupling, and high spots between couplings shall be leveled in order to maintain a minimum of 50 mm (2 in.) under the pipe barrel. The clearance between the trench bottom and the bottom of the coupling and pipe shall be backfilled properly, using material approved by the purchaser. The material shall be compacted using appropriate equipment to provide a firm and uniform bedding along the entire length of the pipe.

NOTE 2—Earth mounds have been used in some areas with success. However, if this method is to be used, particularly for small pipe sizes, caution should be exercised to ensure that (*1*) proper clearance is maintained between the pipe or coupling and the trench bottom, and (*2*) after pipe placement, the earth beneath the entire length of the pipe including the coupling is properly placed beneath the pipe and is compacted to a uniform density specified by the purchaser.

7. Laying of Pipe

7.1 *Lowering of Pipe and Accessories into Trench*—Pipe shall not be lowered into the trench until the pipe bed has been brought to grade. All pipe and accessories shall be inspected for defects. Dirt and other foreign matter shall be removed from the interior and the machined ends before lowering into the trench. Pipe and accessories shall be lowered carefully into the trench by hand or with suitable equipment in a manner that will prevent damage to pipe and fittings or injury to the installers. The sealing surfaces of all materials shall be kept clean during installation.

7.2 *Pipe Joints*—The machined ends of pipe to be jointed, coupling grooves, and rubber rings shall be cleaned immediately before assembly, and assembly shall be made as recommended by the manufacturer. Care shall be taken not to reverse the gasket when placing it in the coupling. Each pipe joint shall be sealed with a coupling consisting of an asbestos-cement sleeve and two rubber rings conforming to Specification D1869 or an equivalent coupling or joint of equivalent strength and performance. The pipe joint shall not be deflected either vertically or horizontally beyond the limits recommended by the manufacturer.

7.3 When pipe-laying is not in progress, the open ends of installed pipe shall be closed to prevent entrance of debris.

7.4 Whenever water is in the pipe trench, enough backfill shall be placed on the pipe to prevent it from floating. Any pipe that has floated shall be removed from the trench and the bedding corrected to conform to 6.2.4. No pipe shall be laid when the weather is unsuitable for proper installation as determined by the purchaser.

7.5 *Closure System*—Closure lengths and closure couplings should be used for tying in asbestos-cement pipe. Closure lengths and closure couplings can span closure distances up to 4 m (13 ft) without any field cutting. They eliminate any possible airborne asbestos fibre exposure, which may result from the field cutting of pipe.

7.6 *Pipe Cutting*—Since the introduction of the closure system, pipe cutting is no longer required in the field. If pipe cutting is done, methods that produce a smooth square cut end, without damage to the pipe, and that do not produce airborne particles, shall be employed. Abrasive discs are prohibited unless they are equipped with local exhaust ventilation and a high efficiency particulate air (HEPA) filter dust collection system.

7.7 *End Preparation*—Whenever it is necessary to cut a length of pipe in the field, the end shall be prepared as follows:

7.7.1 The pipe end of random lengths shall be machined by commercially available field lathes designed for this purpose to ensure that the diameter, profile, and roundness meet the pipe manufacturer's specifications. The machined surface on which the compression ring seals shall be smooth and cylindrical to ensure joint integrity.

7.7.2 The pipe of machined overall lengths shall be bevelled according to the pipe manufacturer's specifications.

7.8 *Mechanical Joints*—The mechanical joint is a bolted joint of the stuffing box (gland and compressible gasket) type.

7.8.1 In some sizes and classes, an adaptor is required between the asbestos-cement pipe and the mechanical joint.

7.8.2 The joints should conform to the current revision of ANSI C111 or AWWA A21.11 and should be assembled as required in Appendix A, of those standards.

7.9 *Poured Joints:*

7.9.1 The yarning or packing material should be specified by the engineer. It generally consists of molded rubber rings. Asbestos rope or treated paper rope may be used only with the approval of the engineer when the space between the bell and machined pipe end will not permit the use of a rubber ring.

7.9.2 The yarning material should be placed around the spigot of the pipe and should be of proper dimensions to center the spigot in the bell. When the machined pipe end is shoved home, the yarning material should be driven tightly against the inside base or hub of the bell with suitable yarning tools.

7.9.3 When a single strand of yarning material is used, it should have an overlap at the top of not more than 50 mm (2 in.).

7.9.4 When more than a single strand is required for a joint, each strand should be cut to sufficient length so that the ends will meet without causing overlap. The ends of the strands should meet on opposite sides of the pipe and not all on the top or all at the bottom. Successive strands of yarning material should be driven home separately.

7.9.5 Polymer resin-joint bells should provide a space for jointing material of not less than 58 mm (2¼ in.) for pipe of 50 mm (21 in.) in diameter and smaller and 65 mm (2½ in.) for pipe 600 to 1050 mm (24 to 42 in.) in diameter.

7.9.6 Lead may not be used for caulking purposes. Use an epoxy polymer resin with an inert filler content adjusted in the field to yield a suitable viscosity for the task at hand.

7.10 *Jointing of Pipe to Fittings:*

7.10.1 *General*—Each valve or fitting connected to asbestos-cement pipe shall have a profile that permits a seal to be made between the machined pipe and the bell of the fitting with a continuous rubber-ring gasket.

7.10.2 Before fittings are laid, all lumps, blisters, and excess coating shall be removed from the bell. The inside of the bell shall then be wire-brushed, and both the inside of the bell and the spigot end of the pipe shall be wiped clean and dry. All surfaces to be jointed shall be kept clean until the joints are made.

7.10.3 *Push-On Joint*—The push-on joint is a single rubber-gasket joint. It shall be assembled by positioning a continuous rubber-ring gasket in the annular groove of the fitting bell and pulling the machined pipe end into the bell. A lubricant approved by the pipe manufacturer must be used. Care should be taken to ensure that the correct size of gasket for the fitting bell is used with the correct size of asbestos-cement pipe.

7.10.4 *Mechanical Joint*—The mechanical joint is a bolted joint of the stuffing-box type. In some sizes and classes, an adaptor is required between the asbestos-cement pipe and the mechanical joint. The joints shall conform to the current revision of ANSI/AWWA C111 A21.11 and shall be assembled as required in Appendix A, Notes on Installation of Mechanical Joints, of that standard.

7.10.5 Length of pipe at fittings and rigid structures. Where rigid joints are formed by caulked materials or by bolts with rubber-ring seals, such as at fittings, the length of 200 mm (8 in.) diameter and smaller pipe fitted into the bell of the fittings shall not exceed 1 m (3 ft 3 in.), and the length of 250 mm (10 in.) diameter and larger pipe shall not exceed 2 m (6 ft 6 in.). At least one flexible joint shall be used between two adjacent rigid joints. A coupling shall be cast in the wall of rigid structures at the point of entry of pipelines to provide flexibility at the wall. To provide additional flexibility, the pipe at the point of entry shall have a laying length of not more than 2 m (6 ft 6 in.).

7.11 *Connections to Rigid Structures*—There are several approved methods for connecting asbestos-cement sewer pipe to manholes and other rigid structures, such as foundation walls (including footings if pipe rests on them) and cradles. The following precautions shall be observed:

7.11.1 Where the pipe barrel is connected directly to a rigid structure, the length of pipe section extending beyond the rigid structure, shall not extend more than 450 mm (18 in.) or more than one half the nominal diameter of the pipe, whichever is greater.

7.11.2 The pipe length limitations as stated in the annex are not applicable when the manhole-to-pipe connection is made by cutting out the top center quadrant of a full pipe length and centering the pipe length in the manhole to form a continuous pipe inverted through the manhole. As a result, the pipe lengths extending beyond the outer manhole surfaces are at least 0.6 mm (2 ft) shorter than a half length. When cementing the pipe into the manhole wall, both surfaces should be wetted before applying mortar to ensure a good bond at the junctures.

7.11.3 When pre-cast concrete manholes are used, standard asbestos-cement couplings with water stop grooves cut in the outside diameter, equivalent in diameter and class to the pipe, can be cast directly into the concrete manhole section to facilitate pipe connection. The casting can be done either on the job site or, by prior arrangement, at the manhole plant facility. Couplings cast directly into manhole sections provide a flexible connection at the point of juncture. Since the pipe does not rest directly on the manhole structure, full pipe lengths can be used at these connections.

7.11.4 The precautions listed above for pipe connections to manholes and other rigid structures are based on the strength characteristics of the pipe, acceptable bedding, backfilling, and tamping practices, and recognition of the fact that a certain amount of settling usually occurs at the manhole. By locating pipe joints close to the manhole or structure, adequate flexibility is built in to accommodate settling without structural damage to the pipe.

7.12 *Setting of Special Fittings*—Manholes and special fittings shall be provided and installed as shown on the drawings or as specified in the purchaser's specifications. They shall be inspected carefully and cleaned as required in 7.10.2 before lowering into place.

7.13 *Closure of Pipe Ends*—For sanitary sewer installations when pipe laying is not in progress, the open ends of the

installed pipe shall be closed by watertight plugs or other means approved by the purchaser. When the trench contains water, and if practical, the plugs should remain in place until the trench is pumped dry.

NOTE 3—Precautions must be taken to prevent pipe flotation should the trench fill with water.

8. Backfilling

8.1 *Backfill Procedure Before Tests:*

8.1.1 Backfill material approved by the purchaser shall be free of any frozen lumps, rock that is 40 mm (1½ in.) or larger in size, and lumps of clay, large stones, boulders, or other unsuitable substances, such as debris. The backfill shall be deposited in the trench up to the horizontal diameter of the pipeline in 150 mm (6 in.) thick compacted layers and shall be sufficiently damp to permit thorough compaction under and on each side of the pipe to provide support that is free from voids.

8.1.2 The pipe and joints shall be backfilled as specified previously and a cushion of material shall be hand-placed over the pipe and joints to an average depth of 300 mm (12 in.) for all sizes of pipe. In no case shall material with a diameter in excess of 40 mm (1½ in.) be placed in the trench in the first 300 mm (12 in.) above the pipe.

8.1.3 Visual inspection is not recommended due to the hazards associated with open trenches.

9. Testing Installed Pipe

9.1 *Provision of a Tested System*—Testing provides the owner with assurance of sound sewer construction, long-term serviceability, and low annual operating and maintenance costs.

9.2 *Test Methods*—Approved methods of testing sanitary sewer pipe should be infiltration and exfiltration, or low-pressure air loss. Closure plugs, caps, and branch connections must be completely secured during the leakage test. Detailed instructions and methods of testing shall be provided by the engineer. At the option of the constructor, and with the approval of the engineer, passage of the air loss test described in 8.2.3 will be acceptable as an alternative to either the infiltration or exfiltration tests.

9.2.1 *Infiltration Test*—Infiltration testing is an acceptable method of leakage testing when the surrounding ground water table is at a sufficient elevation to cover completely the buried pipe. The allowable infiltration of any section of sewer system should be measured by a weir or current meter.

9.2.1.1 Test methodology and allowable infiltration rates should be determined by the engineer.

9.2.2 *Exfiltration Test*—Exfiltration testing is an acceptable method of leakage testing in dry areas or where the ground water table does not cover the pipe. In the exfiltration test, the sewer line under test should be filled with water and pressurized to a head specified by the engineer. After a sufficient time has elapsed and water loss by absorption through manhole structures and the sewer line has been stabilized, the water loss for the test section should be measured. Water loss should not exceed 9.3 l/mm of pipe internal diameter per km of pipe length per day (100 U.S. gallons per inch of pipe internal diameter per mile of pipe length per day).

9.2.2.1 Test methodology and allowable exfiltration rates should be determined by the engineer.

9.2.3 *Low-Pressure Air Test*—The low-pressure air test is basically a measurement of air-pressure drop versus time and pipe diameter. The section of pipe line to be tested should be isolated by completely sealing all outlets in the section under test with plugs specifically designed for air testing sewer pipe. The air compressor that feeds air into the test section should be equipped to control air flow and to prevent test pressures from exceeding a gage pressure of 35 kPa [5 lbf/in.^{2} (5 psi)]. It should be fitted with a blowoff valve set to vent pressure increases above 35 kPa [5 lbf/in.^{2} (5 psi)], which pressure would be hazardous.

9.2.3.1 Test methodology and allowable rates of air loss should be determined by the engineer.

10. Backfill Procedure After Tests

10.1 Upon completion of pressure and leakage tests, exposed couplings shall be covered, and backfill shall be hand-placed to a depth of 300 mm (12 in.) above the top of the pipe and couplings. The balance of backfill shall not contain stones that are more than 150 mm (6 in.) in their largest dimension, and the backfill mixture shall not be used for disposal of refuse. Trenches under pavements and sidewalks shall be backfilled to a compaction density of 90 % as determined by Method T-99 for compaction and density of soils. The balance of the backfill for other trenches and those trenches not in a right-of-way may be backfilled by machine without compaction unless otherwise specified in the purchaser's specifications. Additional backfill material shall be supplied, if needed, to completely backfill the trenches or to fill depressions caused by subsequent settlement.

11. Keywords

11.1 asbestos; asbestos-cement; installing; nonpressure; pipe; storm drain

ANNEX

(Mandatory Information)

A1. RECOMMENDED WORK PRACTICES FOR ASBESTOS-CEMENT PIPE[9]

A1.1 *Airborne Asbestos Fibers as a Possible Health Hazard*— Airborne asbestos fiber has been identified as a possible[10] health hazard. Experience has shown that minimizing exposure to airborne asbestos dust is an effective method of preventing asbestos-related diseases. The recommended work practices as given in AWWA M-16 to minimize exposure to airborne asbestos dust are the best assurances for controlling worker exposure and complying with national, state, and local occupational safety and health regulations governing exposure to airborne asbestos. Permissible exposure levels have been established by OSHA for an 8-h time-weighted average (TWA) exposure and for upper limit concentrations. Tests[9] have shown that the work practices recommended within these standards minimize worker exposure and do not produce asbestos levels in excess of existing OSHA regulations.

A1.2 *Loading and Unloading Operations*—Asbestos-cement pipe is shipped clean from the factory and carefully loaded using methods acceptable to the carrier. Loading, unloading, stringing out and assembling asbestos-cement pipe are essentially dust-free operations. Even in enclosed spaces, airborne asbestos fiber levels from pipe handling operations are far below existing and proposed occupational standards. All hand and mechanical unloading operations shall be performed in accordance with the manufacturer's manuals and as noted in Section 5 of this guide.

A1.3 *Cutting:*

A1.3.1 Pipe cutting methods which produce a smooth, square cut end shall be employed.

A1.3.2 *Carbide Equipment*—Blade cutters consist of a frame adjustable to the circumference of the pipe and a number of outboard, self-tracking rollers that align one or more carbide-tipped cutting blades. Blade cutters are typically hand-operated. Due to the relatively low mechanical input and clean cutting action, significant amounts of airborne asbestos dust are not produced.

A1.3.3 *Snap Cutting Equipment*—Snap cutters or "squeeze and pop" equipment operates by means of cutting wheels mounted in a chain wrapped around the pipe barrel. Hydraulic pressure, applied by means of a remote electrically or manually operated pump, simultaneously squeezes the cutting wheels into the pipe wall until the cut is completed.

A1.3.4 *Abrasive Disk, Dry*—Power drive saws with abrasive disks (masonry blades) shall not be used for dry cutting or beveling asbestos-cement pipe. Abrasive disk cutters produce concentrations of airborne asbestos dust that exceed OSHA permissible levels. THIS WORK PRACTICE IS THEREFORE SPECIFICALLY NOT RECOMMENDED.

A1.4 *Machining:*

A1.4.1 *Field Lathe, Manual*—Manual field lathes are designed to end-trim and re-machine rough pipe barrels to factory-machined end profiles. The lathe consists of an adjustable, self-aligning arbor inserted into the pipe bore (that acts as a mandrel upon which the turning handle operates), a screw-fed turning frame, carbide machining blades, and manual (hand or ratchet) turning handles.

A1.4.2 *Field Lathe, Power*—Power field lathes, like manual lathes, are designed to end-trim and re-machine rough pipe barrels to factory-machined end profiles. The lathe consists of an adjustable, self-aligning arbor inserted into the pipe bore (which acts as a mandrel upon which the turning handle operates), a screw-fed turning frame, carbide machining blades, and electric or pneumatic power drive.

A1.4.3 *Rasp, Manual*—Short lengths of asbestos-cement pipe can be cut for pipe closures, repairs, and to install fittings in exact location. Field cut ends may be rebeveled with a coarse wood rasp to form a taper approximating the same profile as the factory-beveled end.

A1.5 *Hole Cutting–Dry Pipe:*

A1.5.1 *Shell Cutters*—For field connections into asbestos-cement pipe, clean, even entry cuts may be accomplished by means of shell-cutting equipment.

A1.5.1.1 Shell cutters consist of hole-cutter housing mounted on the pipe, a carbide or diamond-tipped hole cutter, and a manual ratchet or a pneumatic, electrical or gasoline drive, to power the cutting head.

A1.5.1.2 When cutting holes in asbestos-cement pipe products, all dust and cuttings shall be removed from the pipe or duct interior after the cutting operation.

A1.5.1.3 Removal of cuttings may be accomplished by flushing with water, wet mopping, or vacuuming prior to placing in service. DO NOT BLOW OUT WITH COMPRESSED AIR, OR DRY SWEEP.

A1.5.1.4 Waste material shall be disposed of in accordance with A1.8.3.1.

A1.5.2 *Drill and Rasp*—Field connections may be made with a heavy duty electric drill and rasp.

A1.5.2.1 Using a carbide-tipped drill, a series of closely-spaced holes are first drilled around the hole outline. The disk is knocked free with a hammer and the edges of the hole are dressed with a coarse wood rasp.

A1.5.2.2 When cutting holes in asbestos-cement pipe products, all dust and cuttings shall be removed from the pipe or duct interior after the cutting operation.

[9] Section 6 of this guide is consistent with AWWA M-16.

[10] Reports prepared by Equitable Environmental Health, Inc.," Asbestos Exposure During the Cutting and Machining of Asbestos-Cement Pipe," March 1977, and "Dust Exposure During the Cutting and Machining of Asbestos-Cement Pipe—Additional Studies," December 1977.

A1.5.2.3 Removal of cuttings may be accomplished by flushing with water, wet mopping, or vacuuming prior to placing in service. DO NOT BLOW OUT WITH COMPRESSED AIR, OR DRY SWEEP.

A1.5.2.4 Waste material shall be disposed of in accordance with A1.8.3.1.

A1.5.3 *Hammer, Chisel, and Rasp*—Holes may be cut into asbestos-cement pipe with a hammer and chisel.

A1.5.3.1 The edge of a plumber's wood chisel is used to cut completely around the hole outline, about 6 mm (0.25 in.) inside the prescribed line. The operation is repeated and the cut deepened until through.

A1.5.3.2 The edges of the hole are then dressed with a coarse wood rasp.

A1.5.3.3 When cutting holes in asbestos-cement pipe products, all dust and cuttings shall be removed from the interior after the cutting operation.

A1.5.3.4 Removal may be accomplished by flushing with water, wet mopping, or vacuuming prior to placing in service. DO NOT BLOW OUT WITH COMPRESSED AIR, OR DRY SWEEP.

A1.5.3.5 Waste material shall be disposed of in accordance with A1.8.3.1

A1.6 *Hole Cutting–Pipe in Service:*

A1.6.1 *"Wet" Cutting of Asbestos-Cement Pipe* (that is in service for lateral connections)—"Wet" cutting for lateral connections may be accomplished using special equipment designed for this purpose.

A1.6.2 The cutting operation is performed in the trench while the pipe is in service.

A1.6.3 The equipment shall be used in accordance with the manufacturer's recommendations and operating instructions.

A1.6.4 Equipment with positive purge features shall be used to minimize the amount of shavings in the pipe being cut.

A1.6.5 Provisions shall be made to flush the pipe being cut during the cutting operation to remove debris from the pipe.

A1.7 *Coupling Removal from Pipe*—Coupling removal may be accomplished by gradually splitting the coupling lengthwise, using a chisel and ball-peen hammer. After the top of the coupling has been split, a crowbar or similar tool is used as a lever to split the bottom of the coupling.

A1.8 *Housekeeping and Waste Disposal:*

A1.8.1 *Housekeeping*—An orderly site is an important part of any safe construction operation. It is even more essential when airborne dust created by the lack of good housekeeping has the potential for harm to employees or others.

A1.8.2 *Equipment*—All external surfaces of equipment shall be maintained free of dust accumulations that might, if dispersed, create asbestos fiber concentrations above permissible exposure limits.

A1.8.3 *Waste Material Disposal:*

A1.8.3.1 Asbestos-cement chips and cuttings from the field operations described in this section shall be disposed of in a manner that will not contribute airborne asbestos dust to the atmosphere. Where cutting and machining operations are performed at the construction site, the chips shall be placed in trench and buried with the pipeline.

A1.8.3.2 Where operations are performed at a central location such as a constructor's or distributor's yard on a more or less continuing basis, the chips and cuttings may be collected and mixed wet with cement and made into non-friable forms. These forms may be used in the trench as supports for fittings and valves, as appropriate.

A1.8.3.3 Chips and cuttings shall be collected in sealed bags or closed containers impermeable to asbestos dust.

A1.8.3.4 Loose material shall never be dry swept. When vacuum equipment is available, it shall be used.

A1.8.3.5 Water or other dust suppressants shall be applied in those circumstances where sweeping is unavoidable.

A1.8.3.6 DO NOT BLOW WASTE MATERIAL WITH COMPRESSED AIR.

A1.8.3.7 No visible emissions to the atmosphere may be permitted to result from the collection, processing, packaging, transporting, or deposition of any asbestos-containing material.

A1.8.3.8 Wastes shall be disposed at a site operated in accordance with applicable national, state, or local laws and requirements.