

ASME A112.3.4-2000

MACERATING TOILET SYSTEMS AND RELATED COMPONENTS

AN AMERICAN NATIONAL STANDARD



The American Society of
Mechanical Engineers



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Mechanical Engineers

A N A M E R I C A N N A T I O N A L S T A N D A R D

MACERATING TOILET SYSTEMS AND RELATED COMPONENTS

ASME A112.3.4-2000

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## FOREWORD

This Standard relates to performance requirements for macerating toilet systems. Such systems are designed for installation in bathrooms of buildings where the building drainage system is located at an elevation above the floor level or where a bathroom is located some distance from the building drain connection.

The initial draft of this Standard was prepared by an ad hoc committee of the International Association of Plumbing and Mechanical Officials (IAPMO). It was then referred to the American Society of Mechanical Engineers (ASME) and was assigned to Project Team 3.4 of the ASME A112 Standards Committee for development as an American National Standard. The resulting proposal was harmonized with CSA B45.9, which was developed by the CSA Technical Committee on Plumbing Fixtures.

Suggestions for improvement of this Standard will be welcomed. They should be sent to The American Society of Mechanical Engineers; Attn: Secretary, A112 Main Committee; Three Park Avenue, New York, NY 10016.

This Standard was approved as an American National Standard on June 22, 2000.

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# MACERATING TOILET SYSTEMS AND RELATED COMPONENTS

## 1 GENERAL

### 1.1 Scope

This Standard establishes physical, performance, and testing requirements applicable to macerating toilet systems and related components. Such systems are intended to collect waste from a single water closet, lavatory, and/or bathtub located in the same room, and grind and pump these macerated wastes to some point in the sanitary drainage system.

The macerating system is comprised of three major components:

- (a) a container that houses the operating mechanisms;
- (b) a pressure chamber that automatically or manually activates and deactivates the induction motor; and
- (c) an induction motor that drives the shredder blades and pump assembly, which is permitted to be combined into a single unit.

The use of alternate materials or methods is permitted, provided it can be demonstrated that such alternatives comply with the performance requirements of this Standard.

### 1.2 Units of Measurement

Values are stated in U. S. Customary units and the International System of Units (SI). The U. S. Customary units shall be considered as the standard.

### 1.3 Reference Standards

The following documents form a part of this Standard to the extent specified herein. The latest issue shall apply.

ASTM C1173, Flexible Transition Couplings for Underground Piping Systems

Publisher: American Society for Testing and Materials (ASTM), 100 Barr Harbor Drive, West Conshohocken, PA 19428

CSA B22.1, Liquid Pumps

CSA B45, Plumbing Fixtures

CSA B602, Mechanical Couplings

Publisher: Canadian Standards Association (CSA), 178 Rexdale Boulevard, Toronto, ON, M/M 1R3

ANSI Z124.4, Plastic Water Closet Bowls and Tanks  
Publisher: International Association of Plumbing and Mechanical Officials (IAPMO), 2001 South Walnut Drive, Walnut, CA 90601

ASME A112.19.2M, Vitreous China Plumbing Fixtures  
Publisher: The American Society of Mechanical Engineers (ASME), Three Park Avenue, New York, NY 10016-5990; ASME Order Department: 22 Law Drive, Box 2300, Fairfield, NJ 07007-2300

UL 778, Motor Operated Water Pumps

Publisher: Underwriter's Laboratories (UL), 333 Pfingsten Road, Northbrook, IL 60062

## 2 PHYSICAL REQUIREMENTS

### 2.1 Water Closets

Water Closets that connect into the macerating system shall comply with either ASME A112.19.2 or CSA B45. The drill line carry test shall not be required. The minimum water spot of the bowl shall not be less than 5 in. x 4 in. (115 mm x 102 mm). The performance of the water closet shall be tested prior to connection to the macerating unit.

### 2.2 Macerating Tank and Components

**2.2.1 Macerating Tank.** The macerating tank assembly shall be watertight, leakproof, and protected from backflow of sewage. The macerating tank shall be free from cracks, porosity, chips, flash, and other significant defects that may effect the performance, appearance, or serviceability of the system. The tank shall comply with the resistance to staining, the wear and cleanability, and the chemical resistance tests of ANSI Z124.4 for plastic sumps.

**2.2.2 Electrical System.** The electrical system in the macerating unit shall be certified by a recognized national testing laboratory.

**2.2.3 Pump.** The pump shall comply with either UL 778 or CSA B22.1 and meet the performance requirements of Section 3.

**2.2.4 Fastening.** A means to fasten the water closet to the holding tank shall be provided.

**2.2.5 Backflow Prevention.** A check valve shall be provided with the macerating system to prevent the return of discharged wastes to the macerating tank. The check valve in the holding tank shall be capable of resisting a pressure of 12 ft (3.6 m) of water.

**2.2.6 Accessibility.** The holding tank shall provide for accessibility of the internal working components.

**2.2.7 Discharge Piping.** The minimum size of the discharge piping shall be  $\frac{3}{4}$  in. (19 mm).

**2.2.8 Venting.** The sump shall be vented in accordance with the manufacturer's instruction with a vent size of not less than  $1\frac{1}{4}$  in. (32 mm).

**2.2.9 Function.** The macerating toilet system shall dispose of the contents of the water closet upon activation of the flushing mechanism in accordance with para. 3.2. The macerating pump shall be capable of discharging the grounded waste to a vertical height of 12 ft (3.6 m).

## 2.3 Gaskets and Tension Bands

**2.3.1 Gaskets.** Piping gaskets shall be watertight when tested according to Section 3. Gaskets shall comply with either ASTM C1173 or CSA B602.

**2.3.2 Tension Bands (Clamps).** Tension bands (clamps) used to connect the fixture with the macerating tank gasket shall comply with the tension band performance tests in either ASTM C1173 or CSA B602.

## 2.4 Instructions

**2.4.1 Installation Instructions.** Each unit shall be provided with installation instructions addressing capabilities, connections to the unit, electrical requirements, other plumbing requirements, and related safety concerns.

The installation instructions shall indicate the installation of a ball or gate valve downstream of the check valve and that all fixtures, which are served by the macerating tank, are to be on the same floor level as the tank.

**2.4.2 Owner/Operator Instructions.** Instructions for the proper operation of the system shall be provided with the unit. The instructions shall indicate the proper use of the product including prohibited uses and applications for the product. The instructions shall

be marked on the cover with instructions to the installer to leave the manual with the owner/operator for future reference.

## 3 TESTING

### 3.1 Cycle Testing

**3.1.1 Test Method.** The macerating pump shall be "on/off" tested for 50,000 cycles.

**3.1.2 Acceptance Criteria.** Upon completion of the cycle testing, the unit shall demonstrate the ability to meet the performance requirements as outlined in paras. 3.2 and 3.3.

### 3.2 Paper Test of the Assembled Unit

**3.2.1 Test Method.** The macerating unit and water closet shall be assembled together in accordance with the manufacturer's instructions. The discharge piping from the unit shall be installed to a maximum elevation as stated by the manufacturer. A check valve shall be installed within the discharge line. Waste piping of a diameter recommended by the manufacturer shall be installed vertically for 12 ft (3.6 m) of discharge and then directed to a safe place of discharge. The water closet shall be filled with water and pressurized to the minimum pressure as recommended by the manufacturer. Two-thousand sheets of heavy, single-ply toilet paper shall be weighed, then separated into four sets of 50 ten-sheet lots. Ten sheets of heavy, single-ply toilet paper shall be distributed evenly in the water closet bowl and the unit shall be flushed. With each successive flush, there shall be no evidence of paper returning to the bowl. After conducting 50 consecutive flush tests, three additional flushes without paper shall be made. The water closet shall then be removed from the housing unit and the internal walls and bottom of the housing shall be inspected for any collection of paper. Continue to conduct this test for an additional 150 cycles, stopping after every 50-paper/three-no-paper cycle in order to inspect the internal housing for paper collection. After completion of the cycle tests, all paper clinging to the walls and the bottom of the tank shall be removed, dried, and weighed.

**3.2.2 Acceptance Criteria.** Not more than 5% of the total weight of the 2,000 sheets shall remain in the sump after testing. If a grill is provided, there shall be no more than 50% blockage of the surface area, as determined by visual inspection. Failure of the unit

to meet these criteria, as applicable, shall be cause for the rejection of the unit.

### 3.3 Hydrostatic Pressure Test of the Check Valve

**3.3.1 Test Method.** The holding tank shall be installed in accordance with the manufacturer's instructions. The tank check valve shall be subjected to a hydrostatic pressure of 12 ft (3.6 m) of water.

**3.3.2 Acceptance Criteria.** The tank check valve shall withstand the test without any signs of leakage.

## 4 MARKING AND IDENTIFICATION

The macerating system shall be marked with the following information:

- (a) the manufacturer's name or trademark;
- (b) the model number; and
- (c) ASME A112.3.4.

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## ASME STANDARDS RELATED TO PLUMBING

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| Air Gaps in Plumbing Systems.....                                                                                                                                       | A112.1.2-1991(R1998)   |
| Performance Standard and Installation Procedures for<br>Stainless Steel Drainage Systems for Sanitary, Storm, and<br>Chemical Applications, Above and Below Ground..... | A112.3.1-1993          |
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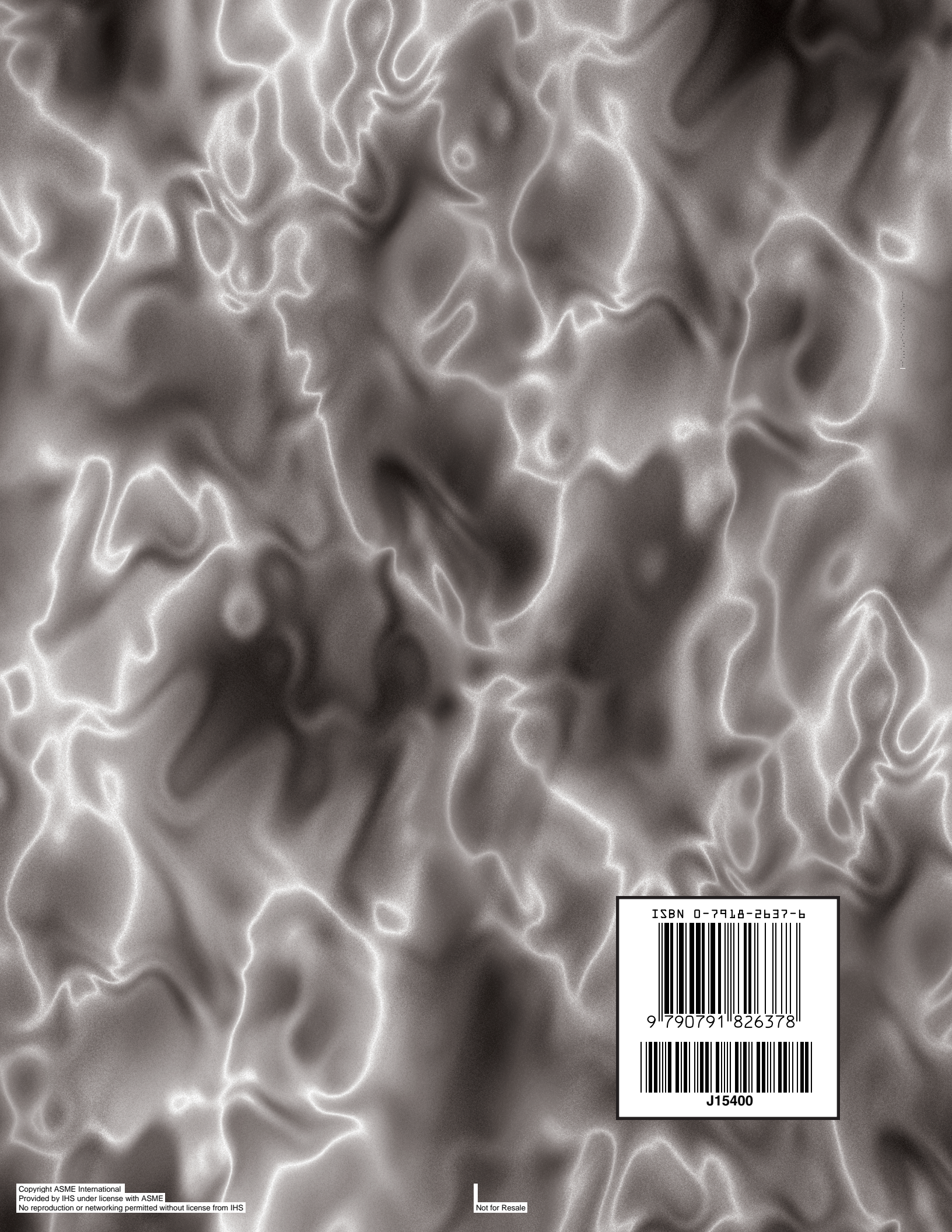
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