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ASME/ANSI A112.19.8M-1987

Suction Fittings for Use in Swimming Pools, Wading Pools, Spas, Hot Tubs, and Whirlpool Bathtub Appliances



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AN AMERICAN NATIONAL STANDARD

Suction Fittings for Use in Swimming Pools, Wading Pools, Spas, Hot Tubs, and Whirlpool Bathtub Appliances

ASME/ANSI A112.19.8M-1987



The American Society of Mechanical Engineers

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FOREWORD

(This Foreword is not part of ASME/ANSI A112.19.8M-1987.)

Since the development of leisure products for recreational enjoyment, the swimming pool, spa, plumbing fixture, and related industries have endeavored to make safety a paramount issue of system and product design.

With the increasing popularity of products for recreational use, some potential hazards have been identified relative to suction fittings used in conjunction with swimming and wading pools, spas and hot tubs, and whirlpool bathtub appliances.

The key potential hazards identified were body entrapment, hair entrapment, and grate strength. This Standard was prepared to provide tests to evaluate a suction fitting's performance relative to these hazards.

Following approval by the A112 Committee, this Standard was approved as an American National Standard by ANSI on November 23, 1987.

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SUCTION FITTINGS FOR USE IN SWIMMING POOLS, WADING POOLS, SPAS, HOT TUBS, AND WHIRLPOOL BATHTUB APPLIANCES

1 PURPOSE

The purpose of this document is to establish a standard for suction fittings which are designed to be totally submerged for use in swimming pools, wading pools, spas, hot tubs, and whirlpool bathtub appliances. Its purpose is to serve as a guide for producers, distributors, architects, engineers, contractors, installers, inspectors, and users; to promote understanding regarding materials, manufacture, and installation; and to provide for identification of fittings that conform to this Standard.

2 SCOPE

This Standard covers dimensions, testing methods, and other significant properties in addition to a general description of the final product, together with methods of marking and identification.

3 GENERAL REQUIREMENTS

3.1 Fitting Use

The fittings covered in this Standard are identified for use in swimming pool, wading pool, spa, hot tub, and whirlpool bathtub appliance installations to provide for a maximum degree of safety from body and hair entrapment. *Fittings* shall be defined as all components, including cover and hardware.

3.2 Alternate Options

The provisions of this Standard are not intended to prevent the use of any alternate material or method of construction provided any such alternate meets the intent of this Standard.

3.3 Assembly Requirement

Fittings shall be designed so that tools are required for disassembly.

4 PHYSICAL TESTING

4.1 Conditions for Tests and Evaluation

4.1.1 General. With the exceptions of paras. 4.2.1 and 4.2.2, which involve a repetitive evaluation, a minimum of 6 new fitting units shall be tested in each test condition. If any 1 fitting fails the test, repeat with 6 more fittings. No failures shall occur in the 6 new fittings. No more than 1 unit in the total of 12 units may fail.

4.1.2 Conditioning. Condition all specimens in water at least 73.4 °F \pm 3 °F (23 °C \pm 2 °C) for at least 2 hr before testing.

4.1.3 Test Fixture. The fitting(s) shall be installed in a rigid fixture which is capable of supporting the fitting(s) in a manner similar to the actual installation.

4.1.4 Test Equipment. A point load machine calibrated in readings of 5 lb increments and equipped with a 2 in. diameter tup with a $2\frac{1}{2}$ in. radius nose, tested in accordance with the procedure in ASTM D 2444-80, shall be used for the deflection and point impact tests.

4.1.5 Crack Detection. Contrasting ink shall be used to detect cracks.

4.2 Point Loading and Deflection for Structural Integrity Tests

4.2.1 Deflection Testing of a Fitting Installed in the Horizontal Plane

4.2.1.1 Test Method. Subject the center of the fitting face to a point load of 300 lb ± 2 lb. Test all six units.

4.2.1.2 Performance Requirement. Deflection in excess of 0.350 in. at the load requirement shall be deemed a failure. Further, the fittings shall not disintegrate or crack.

NOTE: *Disintegrate* means the loss of any material from the fitting.

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4.2.2 Point Load to Protrusion

4.2.2.1 Test Method. Subject the same six units in para. 4.2.1 to additional loading in 25 lb increments with a load speed of 0.2 in./min to 0.25 in./min until the tup protrudes through the grate.

4.2.2.2 Performance Requirement. The fitting shall not disintegrate.

4.2.3.1 Test Method. Fittings whose horizontal edges extend from the vertical wall $\frac{1}{2}$ in. or more shall be tested by the application of a 150 lb test load applied vertically on the topmost surface of the fitting. The six units shall be tested using a flat surface.

4.2.3.2 Performance Requirement. The grating shall remain in place. The fitting shall not crack or disintegrate.

4.3 Vacuum and Point Impact Test

4.3.1 Test Method. Subject each of the six fittings to the following sequence.

(a) Cover the fitting to be tested with a 20 mil plastic material or other suitable material. Connect the fitting outlet to a vacuum system and subject it to a 28.5 in. Hg vacuum within 60 sec ± 5 sec and sustain the vacuum for 300 sec ± 10 sec.

(b) Cease the vacuum, remove the plastic film, and impact the center of the fitting at 15 ft-lb using the same method as described in para. 4.2.3.

(c) Again cover the fitting with the plastic film and again apply the 28.5 in. Hg vacuum within 60 sec ± 5 sec, and sustain the vacuum for an additional 300 sec ± 10 sec.

(d) After removal from the test fixture, apply water-soluble contrasting ink and inspect for cracks, breaks, or fractures.

4.3.2 Performance Requirement. The fitting shall not crack or disintegrate.

5 HAIR ENTRAPMENT TEST

5.1 Conditions for Test

A container of sufficient depth to provide a minimum of $12\frac{1}{2}$ in. of water above the uppermost portion of the suction fitting shall be used. A properly grounded pump capable of producing a GPM flow rate of at least 25% greater than the fitting manufacturer's recommended GPM rating of the fitting shall be used.

NOTE: A $1\frac{1}{2}$ hp or 2 hp pump is usually suitable for fittings up to 2 in. pipe diameter.

A flowmeter with an accuracy of $\pm 2\%$ shall be attached to the discharge outlet of the pump according to the flowmeter manufacturer's recommendations or instructions.

5.2 Test Method (See Fig. 1)

(a) Install the suction fitting to be tested through the side wall of the container and connect it to a 90 deg. elbow located on the outside and as close to the suction fitting as possible. Attach a minimum of 16 in. of straight Schedule 40 pipe to the elbow as per Fig. 1.

(b) Fittings other than $1\frac{1}{2}$ NPS shall be connected to the same pipe size as the fitting.

(c) Connect the pump inlet to the 16 in. piece of Schedule 40 pipe.

(d) Fill the tank to a point 12 in. $\pm \frac{1}{2}$ in. above the uppermost portion of the fitting to be tested.

(e) Secure 2 oz of natural, medium-to-fine, straight, light-colored hair, 16 in. in length, to a 1 in. diameter by 12 in. long wooden dowel. A method for attaching a scale shall be provided on the opposite end. A fresh sample of hair shall be used for each test fitting.

(f) A scale accurate within +1% to -0% of the full scale shall be used to determine pounds of pull against the entanglement.

(g) Actuate the pump and regulate the flowmeter to 10 GPM less than the fitting manufacturer's recommended GPM flow rate.

(h) Saturate the hair¹ for a minimum of 2 min in testing water. After being saturated, place the free end of the hair approximately 12 in. in front of the suction fitting and above the uppermost surface of the face of the fitting, as illustrated in Step A of Fig. 2. Place the dowel 12 in. from the fitting face.

(i) Slowly lower the hair closer to the fitting and feed the ends of the hair into the fitting in the direction of the intake flow. Continue to slowly feed the hair by moving the dowel from side to side while shortening each pass of the dowel for a minimum of 2 min. Then lay the dowel end against the fitting for a minimum of 30 sec.

¹Prior to use, the hair shall be cleaned in 10% solution by volume of Alpha Olefin Sulfate (ASO) and water. After cleaning thoroughly, rinse in clear water.

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(*j*) With the pump still operating, test for the amount of pull necessary to free the hair from the fitting. Measure the force of entanglement by pulling the scale and dowel vertically. Repeat the test ten times.

(k) If in compliance with the flow rate, increase the flow rate in 5 GPM increments and repeat for ten more times at each flow rate. Brush hair periodically to keep tangle-free.

(1) If a failure is determined with a specific 5 GPM increase, the unit may be retested in 1 GPM increments in order to determine its best performance value.

5.3 Performance Requirement

A pull of 5 lb or greater on any one of the ten tests, including the weight of the saturated test apparatus, shall be deemed a failure, and the flow rate in GPM at failure shall be recorded. Divide this rate by 1.25 to determine the maximum allowable rating of the fittings. After the rating has been ascertained, reevaluate the fitting at 25%, 50%, and 75% of that allowable rating.

6 BODY ENTRAPMENT

The structural integrity testing as required in paras. 4.1 through 4.2.3 is intended to evaluate the fitting for the prevention of body entrapment.² ASME/ANSI A112.19.8M-1987

7 MATERIAL

7.1 UV Degradation of Fittings Intended for Outdoor Exposure

When plastic materials are used, UV inhibitors shall be added to the polymer mixture.

8 MARKINGS AND IDENTIFICATION

The fitting shall have permanently installed markings as follows:

- (a) manufacturer's name or registered trademark(b) model number
- (c) flow rate in GPM

²In addition to these test methods, these products should be installed to minimize the potential for body entrapment. Sample installation procedures may be found in section 308(e) of the Uniform Swimming Pool, Spa and Hot Tub Code, published by the International Association of Plumbing and Mechanical Officials, 5032 Alhambra Avenue, Los Angeles, CA 90032, (213) 223-1471. The standards for public and private spas published by the National Spa and Pool Institute (NSPI), 2111 Eisenhower Avenue, Alexandria, VA 22314, (703) 838-0083, also provide similar guidance. See NSPI-2, "Minimum Standards for Residential Spas," and NSPI-3, "Minimum Standards for Public Spas."

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NOTE: (1) Test area may be adapted to handle more than one suction fitting.

FIG. 1 TEST TANK FOR DETERMINING SUCTION FITTING RATING

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Step A Starting Position





Hold against fitting

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Step C Final Position

FIG. 2 STEPS TO TEST SUCTION FITTINGS

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