



Household Tumble Type Clothes Dryers

ANSI/AHAM HLD-1-2010



Leadership > Knowledge > Innovation

PREFACE

The Association of Home Appliance Manufacturers develops standards in accordance with AHAM's "Policy and Procedures Governing Technical Standards" which states:

"AHAM Standards shall be in the best interest, mutually, of consumers who use appliances, the industries which provide and service appliances, and other interested parties. They shall relate to actual use conditions, be technically and scientifically sound and written to be understood by non-technical persons."

Use or observance of AHAM standards is voluntary.

AHAM standards are presented to the American National Standards Institute (ANSI) for recognition as American National Standards. This standard was so recognized on June 11, 2010 and bears the American National Standard designation ANSI/AHAM HLD-1-2010.

This standard contains test procedures which may be applied to any brand or model of household tumble type clothes dryer for measuring performance. Results of tests in accordance with this standard may be publicly stated.

With regard to safety, AHAM recommends that all appliance products--both major and portable--manufactured or marketed in the United States be submitted to an appropriate independent laboratory for inspection and listing in conformance with the safety standards and procedures followed by such laboratories. The relevant standard for clothes dryers are ANSI/UL 2158, *Electric Home Clothes Dryers*, and ANSI Z21.5.1/CSA 7.1, *Gas Clothes Dryers - Volume I, Type I Clothes Dryers*.

AHAM's Home Laundry Engineering Committee recognizes that, as in all scientific work, and especially that applied to consumer products, there are certain technical limitations and pitfalls in interpretation which are easy to overlook. Users are urged to watch for these and send them to AHAM headquarters to be added to future editions.

Do not compare machines tested under unlike conditions unless differences are clearly stated.

Previous editions of this standard contained a Wrinkling Test for evaluating garment wrinkling in a finished dryer load. This test has been deleted from this edition. A new version of the Wrinkling Test will be developed for inclusion in the future.

AHAM welcomes comments and suggestions regarding this standard. Any standard may be reviewed and improved as needed. Any interested party, at any time, may request a change in an AHAM standard. Such request should be addressed to AHAM's President, and should be accompanied by a statement of reason for the request and a suggested alternate proposal.

Copyright © 2010 by the Association of Home Appliance Manufacturers (AHAM)

All rights reserved.

The hard copy print version of this document shall be for individual use only.

The electronic file version of this document shall be for storage on one computer for purposes of viewing and/or printing one copy for individual use only.

This document shall not be reproduced in whole or in part by any means, and shall not be transmitted electronically or otherwise to a third person without the prior written permission of AHAM.

CONTENTS

Section	Page
1. PURPOSE	1
2. SCOPE	1
3. GENERAL CONDITIONS	1
4. MOISTURE REMOVAL	5
5. CLOTHES TEMPERATURE MEASUREMENT	7
6. SAFETY	10
Annex A (informative) SPECIFICATIONS FOR BASE LOAD	11
Annex B (informative) TEST MATERIALS	13
Annex C (informative) MAINTENANCE OF AGE PROFILE IN BASE LOAD	14
Annex D (informative) SAMPLE OF ELECTRIC DRYER CALCULATIONS	17
Annex E (informative) SAMPLE OF GAS DRYER CALCULATIONS	18
Annex F (informative) SAMPLE OF ELECTRIC DRYER CALCULATIONS	19
Annex G (informative) SAMPLE OF GAS DRYER CALCULATIONS	20
Annex H (informative) MOISTURE REMOVAL DATA SHEETS	21
Annex I PRE-TREATMENT AND NORMALIZATION	23

1. PURPOSE

This standard establishes a uniform, repeatable procedure or standard method for evaluating the performance of home laundry clothes drying equipment as indicated in Section 2.

The standard methods provide a means to compare and evaluate different brands and models of household clothes dryers regarding characteristics significant to product use.

The standard methods are not intended to inhibit improvement and innovation in product testing, design or performance.

2. SCOPE

This standard applies to home laundry clothes drying equipment and includes methods for testing and evaluating performance of home laundry equipment as defined in Section 3.1. Dryers operated for the regular use of more than one family are not included within the scope of this standard.

Dryers tested for comparison purposes are to have all deviations from specified test conditions clearly stated.

3. GENERAL CONDITIONS

3.1 Home Laundry Clothes Drying Equipment. For the purposes of this standard, home laundry clothes drying equipment is viewed as:

A power driven machine for drying fabrics by evaporation through the use of various combinations of heat, air flow and tumbling. Either electricity or gas may be used as the heat source. Dryer time may be controlled by operator pre-selection of the dryer time interval, or automatic control determined by measurements made by the machine.

3.2 Base Load. The base load is comprised of the bed sheets, pillow cases and hand towels specified in Annex A.

A base load should not be used interchangeably for both washer and dryer testing.

See Annex B for information pertaining to suppliers.

3.2.1 Usage. No item shall be used for more than 84 test cycles, not counting pre-treatment and normalization cycles.

To minimize the influence of aging of the textiles, the base load shall consist of sheets, pillowcases and hand towels of mixed age. The weighted average age of the load should be between 29 and 51 test cycles. Examples of how to create and maintain a mixed age load, and how the average age of a load may be estimated, are given in Annex C.

3.2.2 Load Weights. All weights are "bone dry" weights when base load is dried in accordance with Section 3.3.1. The "bone dry" weight must be determined after each nine test runs.

Minor variations in individual item weights may occur.

The assembled base load is weighed. If the measured weight differs from the desired weight by more than 0.125 lb (57 g), final adjustment of the base load weight is made by adding or removing hand towels as necessary.

Dryers may be tested for loads of any or all sizes.

3.2.3 Base Load Pre-Treatment for New Textiles. New textiles shall be pretreated before their first use and normalized after each 9 drying cycles. Follow the parameters in Annex I Table I.1.

3.3 Test Conditions

3.3.1 Bone Dry. To obtain consistency in determining load weight, the load is to be dried to a condition defined as "bone dry" weight. It is recommended that drying be done in a commercial dryer with a basket volume of 12 ft.³ (0.34 m³) to 20 ft.³ (0.57 m³), heat input of 75,000 to 150,000 Btu/hr or of 22 to 44 kW and an air flow of 350 ft.³ (9.9 m³) to 800 ft.³ (22.6 m³) per minute.

"Bone dry" weight is obtained by the following procedure:

Place dry load in a gas commercial dryer for 10 to 40 minutes depending upon the load size. Remove load before cool down and record weight. Place load back in dryer and continue drying for 10 minute periods until the final weight change is 0.02 lbs.(9.1 g) or less.

3.3.2 Wetting Down Load. Place base load in (front or top) load washer. Check to ensure water coming into load is 60F +/-5F(16C +/-3C) water of 0 to 17 ppm hardness. Place washer on rinse & spin cycle or a similar cycle allowing base load to evenly saturate. The goal is to achieve 70% RMC +/-5% after extraction by spinning the load. Upon removal of the load, place on scale and make final weight adjustments, if necessary to within 0.02 lbs (9.1 g) of 170% the "bone dry" weight. If weight is off it can be adjusted by continuing extraction or sprinkling load uniformly with water.

3.3.3 Power Source. Connect the dryer to a voltage source of 120/240 or 208/120 measured and maintained at the dryer terminal block. Measure and record watts input and compare to manufacturer's nameplate rating.

Maintain power input for electric dryers and gas input for gas dryers in accordance with the manufacturer's nameplate at a voltage of 120/240 ± 2% and Btu rating +/-5% (or record deviations).

3.3.4 Test Room Conditions. Maintain test room conditions at 75 ± 3°F (24 ± 2°C) and 50 ± 10% relative humidity (or record deviations).

3.3.5 Exhausting.

Two exhaust simulators are available. The standard simulator (Section 3.3.5.1) has been used for many years. A modified simulator (Section 3.3.5.2) is now included as a more convenient option. Only limited testing has been done to compare the two simulators. Users are invited to test both options and submit results and comments to AHAM for consideration.

For condenser dryers, exhaust installation is as recommended by the manufacturer.

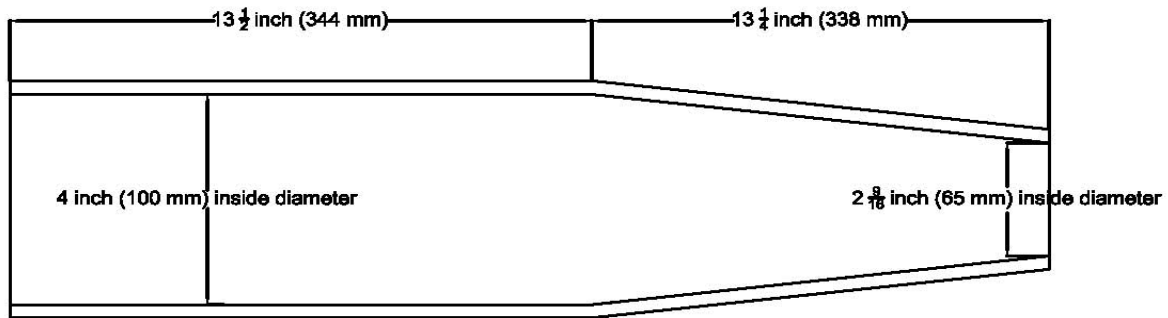
Test room conditions shall be maintained as specified in Section 3.3.4 during the test.

3.3.5.1 Standard Simulator

Restrict the dryer exhaust by adding the AHAM exhaust simulator, (Figure 1). Tape all external joints to prevent air leakage using aluminum or duct tape.

The dryer exhaust with the standard Simulator in place should be placed more than 9 inches (22.5 cm) from any wall or solid surface perpendicular to its exhaust stream.

Figure 1 — Standard AHAM Exhaust Simulator



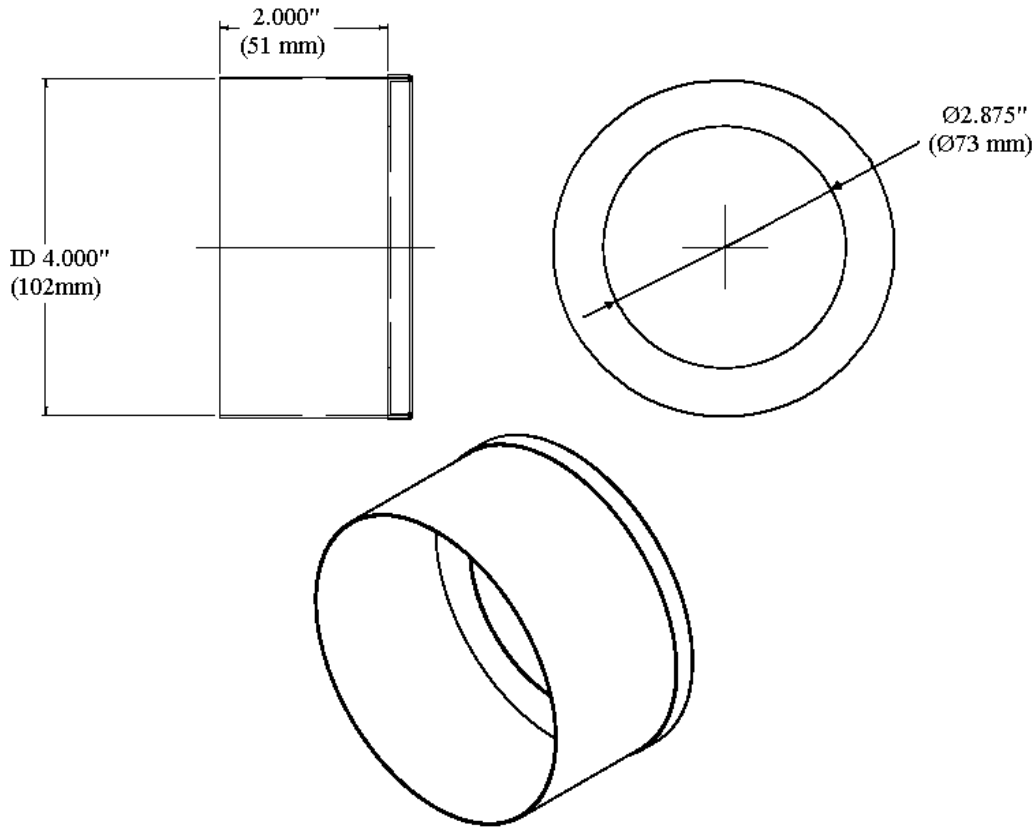
NOTE: Recommended material for the Simulator is 22 gauge steel or equivalent. The Exhaust Simulator represents 8 ft. (2.4 m) of 4 inch (102 mm) pipe, 2-90° elbows and a standard weather hood.

3.3.5.2 Modified Simulator

Restrict the dryer exhaust by adding the modified AHAM exhaust simulator (Figure 2). Ensure the modified AHAM exhaust simulator is tightly secured to the exhaust of the dryer using aluminum or duct tape to prevent air leakage. Orifice plates are sensitive to open area and particular care should be taken in having a well centered hole of 2.875 ± 0.040 inches (73 ± 1 mm).

The dryer exhaust with the modified simulator in place should be placed more than 6 inches (15 cm) from any wall or solid surface perpendicular to its exhaust stream.

Figure 2 — Modified AHAM Exhaust Simulator



NOTE Recommended material for the Simulator is 26 gauge Galvanized steel or equivalent. The modified exhaust simulator represents 8 ft. (2.4 m) of 4 inch (10 mm) pipe, 2-90° elbows and a standard weather hood.

3.3.6 Lint Filter. If dryer is equipped with a lint filter, it is to be thoroughly cleaned before each test run.

3.3.7 Control of Test. Perform all operations in sequence with minimum delay to avoid excessive change of conditions.

3.4 Method of Loading. Follow the manufacturer's recommendations. If none are given or if standard conditions are desired, proceed as follows:

- Load sheets, pillowcases and hand towels individually into dryer drum.
- Alternate large and small load items.
- Items shall not be twisted and tangled.

4. MOISTURE REMOVAL

4.1 Purpose. To determine drying time and energy efficiency.

4.2 Equipment

- a) Stopwatch or clock.
- b) Scale – lbs with 0.02 lb graduations.
- c) Platform scale – optional.
- d) Wattmeter, watt-hour meter.
- e) Plastic laundry bag.
- f) Gasmeter - ft³ and 0.001 ft³ graduations.
- g) Thermometer or other temperature measuring device.
- h) Barometer – measures atmospheric pressure, data used for gas dryer calculation.
- i) Hygrometer or psychrometer – measures humidity of atmosphere.
- j) Manometer – measures relative pressure of gasses and vapors.
- k) Calorimeter – measures quantities of absorbed or emitted heat for determining specific heats of gas.

4.3 Material. Standard load of sheets, pillowcases, and towels as defined in Annex A.

4.4 Test Preparation. Power source, test room conditions, load preparation and exhausting as in Section 3.

4.5 Procedure.

4.5.1 Dryers are operated at maximum temperature setting and not permitted to advance into cool down.

The load in timer dryers is dried to 5% +/-1% moisture retention. The timer should be reset as required to achieve the desired moisture retention level and record the number of times required.

4.5.2 Before each test operate dryer without heat until exhaust temperature is within 10F (6C) of the ambient temperature.

4.5.3 Insert damp load (Section 3.3.2) into dryer using the procedure in Section 3.4.

4.5.4 Stop the dryer when it just reaches cool down.

In the case of timer dryers, as the load approaches 5% +/-1% dryness, as estimated from experience or continuous weighing, stop the dryer.

4.5.5 Remove the load from dryer, place in a plastic bag (Section 4.2e) and tie bag securely. Confirm net weight on scale with 0.02 lb graduations (Section 4.2b).