



Designation: D4330 – 94 (Reapproved 2017)

## Standard Practice for Evaluation of Fiberglass Boat Polish and Wax<sup>1</sup>

This standard is issued under the fixed designation D4330; 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 ( $\epsilon$ ) indicates an editorial change since the last revision or reapproval.

### 1. Scope

1.1 This practice covers the properties to test and the apparatus to use when evaluating the performance of boat polishes and waxes, in terms of ease of application, cleaning efficiency, gloss and improvement of aesthetic appearance.

1.2 *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 *ASTM Standards:*<sup>2</sup>

**D2825 Terminology Relating to Polishes and Related Materials**

### 3. Significance and Use

3.1 Boat polish or wax aids in cleaning and maintaining the surface of fiberglass boats. The function of cleaning is very important.

3.2 This practice defines the properties to be tested, the apparatus to use, and the comparisons of product performance. It is recognized that considerable discretion exists among formulators and marketers of boat polish on what properties or performance characteristics are best for their products. This practice is flexible to honor this fact.

3.3 The methods of testing are subjective and empirical in order to conform to the basic characteristics of the industry and to allow flexibility in testing. Although test panels may be used for screening purposes, actual boat surfaces should be used for the final evaluation.

### 4. Apparatus and Materials

4.1 *Sample of Polish or Wax.*

<sup>1</sup> This practice is under the jurisdiction of ASTM Committee D21 on Polishes and is the direct responsibility of Subcommittee D21.04 on Performance Tests.

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<sup>2</sup> 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.

4.2 *Sample of Control Polish or Wax*—The control is selected subjectively for comparison to the test sample. It may be a competitive product, a modified formulation of the test polish or wax, and so forth. The control must be of the same or similar type as the test sample. It would not be meaningful to select a paste product as a control for comparison to a liquid test polish or wax. In addition, polishes to be evaluated should be for the same intended use. Products for below the water line may be different than those designed for above the water line.

4.3 *Test Substrates*—The test substrate<sup>3</sup> shall be intended for the test polish or wax. The test surface shall be in good physical condition, not badly cracked, scratched, or otherwise damaged so as to interfere with evaluations of polish or wax properties. The minimum test surface area for each sample shall be 200 in.<sup>2</sup> (1290 cm<sup>2</sup>). Whenever possible, the evaluation of test polish or wax should be made on boats subject to actual use and exposure to diverse but normal conditions.

4.4 *Polishing Cloth*—The same type of polishing cloth shall be used with each sample tested. Separate cloths shall be used for each sample. Materials such as washed cheese cloth, rumple cloth, flannel, cotton diaper cloth, and nonwoven fabrics are suitable for this purpose. Felt or paper shall not be used.

4.5 *Cleaning Solvent*—Aliphatic solvents with Kauri Butanol values less than 38.

4.6 *Eye Droppers and Distilled or Deionized Water.*

4.7 *Masking Tape*, with a 3/8-in. (9.5 mm) width.

4.8 *Thermometer.*

4.9 *Humidity Gage.*

### 5. Test Conditions

5.1 The temperature and relative humidity of the test runs shall be measured and recorded. The temperature shall be within 55 to 85°F (13 to 29°C) with a relative humidity of 20 to 80 %.

5.2 The substrate shall have the same temperature as the surrounding area.

<sup>3</sup> Type of fiberglass, polyester or gel coat, or both.

## 6. Personnel and Instructions

6.1 The application and evaluation of the test and control polishes or waxes require four individuals. They shall be capable of making discriminating judgements of subjective physical and aesthetic properties. Training and orientation to specific product performance characteristics may be required.

6.2 The four persons each apply the polishes or waxes to one of the four test substrates. All persons then rate all properties except application properties on the remaining three substrates to which they did not apply polish. The persons applying the polishes or waxes rate ease of use and other application properties. There will be only four readings on application properties. The three rating the other properties do not observe the application because they rate properties of each polish or wax “blind.”

## 7. Procedure

7.1 *Cleaning of Test Substrates*—Clean the test substrate thoroughly with an aliphatic solvent having a Kauri Butanol value less than 38. Soft cotton towels may be used to apply the solvent to the surface and to wipe it clean. Use new or adequately laundered towels. If previously tested polishes contained resins or reactive polymers or both, or unknown polishes have been previously used on the test substrate, preclean first with an abrasive cleaner to ensure their removal.

7.2 *Surface Subdivision*—Divide and outline the precleaned surface of each test substrate by tape with uniform squares.

7.3 *Application of Polish or Wax*—Assuming the control polish or the test polish is a commercially available product, follow the directions on the container so far as is possible. When in doubt on the method of use, the directions for similar products may be used. Use equal volumes of control and test polish or wax to avoid excessively thin or heavy coats. One or two applications may be used depending on the substrate and the discretion of the tester. The same number of coats must be used for both the test sample and the control.

## 8. Placement of Polishes or Waxes

8.1 *Method A*—A controlled randomized method of laying out the test (X) and control (C) polishes or waxes is represented as follows:

Test Substrate	Left	Center	Right
1	C	X	C
2	C	C	X
3	X	C	X
4	X	X	C

These four positionings should be written on tags and drawn randomly by each of the four who apply the polishes.

8.2 *Method B*—A controlled randomized method of laying out the test (X) and control (C) polishes is represented as follows:

Test Substrate	Left	Right
1	C	X
2	X	C
3	C	X
4	X	C

These four positionings should be written on tags and drawn randomly by each of the four who apply the polishes.

## 9. Evaluation

9.1 General comparison is made between the test polish or wax and the control.

9.2 *Application Properties*—During the application of the polish or wax the first phase of evaluation is begun. In each case comparison is made between the test sample and the control. All or any number of the following properties are evaluated:

9.2.1 *Ease of Application*—During the application of the polishes or waxes, note the ease of wetting, spreadability, and absence of drag.

9.2.2 *Cleaning Effect of Polish*—Following the application of the polishes or waxes, inspect the discoloration, if any, on applicators (towels). Observe the ease of removal of the oxidized film as well as common fouling agents such as algae, grease, oils, and so forth. This may be done either in the laboratory or during actual use trials of the products. A good cleaner usually enhances the appearance of the substrate. A poor cleaner may leave a dull, soiled, or mottled appearance.

9.2.3 *Drying Rate*—Take readings of time in minutes for each polish or wax to dry.

9.2.4 *Ease of Wipe Off*—Note effort necessary to wipe off each of the samples from test substrate.

9.2.5 *Powdering*—Note the degree of powdering, if any, during the wipe off of samples from test substrate.

9.2.6 *Ease of Rub-up to Maximum Gloss*—During application of the polishes or waxes note the time and ease with which each product develops the maximum gloss.

9.3 *Final Properties*—Five to ten minutes after the application of the polishes or waxes, begin the second phase of the evaluation. In each case comparison is made between the test sample and the control. All or any number of the following properties are evaluated:

9.3.1 *Gloss*—Evaluate as depth of gloss (the optical phenomenon of relative depth perceived when viewing reflective surfaces), or as defined in Terminology [D2825](#).

9.3.2 *Uniformity*—Observe the surface for streaks, unpolished dry spots, and general uniformity.

9.3.3 *Film Clarity*—Observe the clearness or sharpness of an object’s image in the polished or waxed surface. Overhead lights, face, hands, or other objects may be used for reflection. This test may be eliminated for low luster surfaces that do not possess mirror-like finishes.

9.3.4 *Smear and Mar Resistance*—Smear is the degree of oiliness or greasiness after the polish or wax is rubbed-up to the desired appearance. Mar is the degree of film damage resulting from a glancing blow to the polished or waxed substrate. Check smear by making a design such as an “S” with one’s finger. A glancing blow with one’s knuckles or soft object such as a book or magazine may be used for determining the degree of mar.

9.3.5 *Film Healing*—Observe the length of time required for the smear or mar in 8.3.4 to disappear from the applied film. If either the smear or mar does not disappear after 60 min, this should also be noted.

9.3.6 *Rebuffability*—Observe the ease and completeness of repairability when the smears and mars are buffed with a polishing cloth. Note the amount of physical effort and length of time required.

9.3.7 *Gloss Retention*—Observe the degree of gloss of a freshly applied film compared to that of an exposed polish or wax.

**10. Report**

10.1 *Method A*—Using “Placement of Polishes or Waxes Alternate A,” rate all properties 0 to 5. A value of 5 equals excellent and 0 equals complete failure. Values in between are various degrees between these extremes. This is a monadic value system for each test surface evaluated based on each individual rater’s own reference scale. Because the three individuals rating the final properties do not know the placement sequence, each polished area is rated “blind” with no possibility for bias.

10.1.1 Fig. 1 shall be used to record raw data. Fig. 2 shall be used to summarize and compare the raw data. The following calculation provides a rating factor for each property tested:

- $F$  = rating factor for test polish or wax,
- $F_c$  = rating factor for control polish or wax,
- $x_{\text{property}}$  = sum of all readings of a specific property for the test polish or wax,
- $c_{\text{property}}$  = sum of all readings of a specific property for the control polish or wax,
- $n$  = number of observations,
- $F$  =  $X_{\text{property}} / n$ , and
- $F_c$  =  $C_{\text{property}} / n$ .

10.2 *Method B*—Using “Placement of Polishes or Waxes Alternate B,” rate all properties 1 to 5 with the control surface always giving a rating of 3 regardless of how good or bad it really is. The scale has the following adjectival ratings:

- 1 = significantly poorer than control.
- 2 = slightly poorer than control.
- 3 = no difference from control.
- 4 = slightly better than control.
- 5 = significantly better than control.

10.2.1 This value system is a paired comparison with the control surface always acting as the point of reference. Because the three individuals rating the final properties need the control

Properties	Test Panel Application No. 1			Test Panel Application No. 2		
	Left	Center	Right	Left	Center	Right

Properties	Test Panel Application No. 3			Test Panel Application No. 4		
	Left	Center	Right	Left	Center	Right

Rating Scale: 0 to 5  
 5—excellent                      2—fair  
 4—very good                    1—poor  
 3—good                            0—complete failure

NOTE 1—Designate position of product (X or C) in box designating position on test panel; that is, left, center, or right.

**FIG. 1 Fiberglass Boat Polish and Wax Evaluation—Individual Ratings for 9.1.1.**

Products Compared \_\_\_\_\_

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Surfaces Used for Testing \_\_\_\_\_

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Temperature \_\_\_\_\_ Relative Humidity \_\_\_\_\_

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Date \_\_\_\_\_ Evaluator \_\_\_\_\_

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Properties	Summary of Product (X) Properties			Summary of Control (C) Properties		
	n	<sup>x</sup> Properties	F	n	<sup>c</sup> Properties	F <sub>c</sub>

**FIG. 2 Fiberglass Boat Polish and Wax Evaluations—Summary of Individual Ratings for 9.1.1.**

surface to be identified, the identification of the control product must not be revealed to prevent bias.

10.2.2 Fig. 3 shall be used to record the raw data. Fig. 4 shall be used to summarize and compare the raw data. The following calculation provides a rating factor for each property tested.

- $F$  = rating factor for test polish or wax,
- $x_{\text{property}}$  = sum of all readings for a specific property for the test polish or wax,
- $n$  = number of observation, and
- $F_x$  =  $X$  property /  $n$ .

Specific properties ( $F_c$ ) of the control are assigned a value of 3.0.

10.3 Record temperature and relative humidity at time tests were run.

**11. Precision and Bias**

11.1 *Method A*—Due to the subjective nature of this practice, no precision and bias can be established.

11.2 *Method B*—Due to the subjective nature of this practice, no precision and bias can be established. However, because all the rating factors are in relation to the control, the values can be analyzed statistically to determine if the differences observed are significant.

**12. Keywords**

12.1 buffability; gloss; gloss retention; heal; polish; polishing cloth; powdering; smear; wax

Properties	Test Panel Application No. 1		Test Panel Application No. 2	
	Control	Test	Test	Control

Properties	Test Panel Application No. 3		Test Panel Application No. 4	
	Control	Test	Test	Control

Rating Scale: 1 to 5  
 5—significantly better than control  
 4—slightly better than control  
 3—no difference from control  
 2—slightly poorer than control  
 1—significantly poorer than control

**FIG. 3 Fiberglass Boat Polish and Wax Evaluation—Individual Ratings for 9.2.1.**

Products Compared \_\_\_\_\_

Surfaces Used for Testing \_\_\_\_\_

Temperature \_\_\_\_\_ Relative Humidity \_\_\_\_\_

Date \_\_\_\_\_ Evaluator \_\_\_\_\_

Properties	Summary of Test Product Properties			Summary of Control Product Properties
	n	*Properties	F	F <sub>c</sub>
				3.0
				3.0
				3.0
				3.0
				3.0
				3.0
				3.0
				3.0
				3.0
				3.0
				3.0
				3.0
				3.0
				3.0
				3.0
				3.0
				3.0
				3.0
				3.0
				3.0
				3.0

**FIG. 4** Fiberglass Boat Polish and Wax Evaluation—Summary of Individual Ratings for 9.2.2.

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