Designation: D 3836 – 94 (Reapproved 1999)

Standard Practice for Evaluation of Automotive Polish[1]

This standard is issued under the fixed designation D 3836; 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.

1. Scope

1.1 This practice covers testing properties and apparatus used in evaluating the performance of automotive polishes. This practice is applicable to products that are commonly referred to as car/auto wax, cleaner wax, polish, etc.

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. Terminology

2.1 *Definitions of Terms Specific to This Standard:*

2.1.1 *automotive polish*—aids in cleaning and improving the appearance of automobile finishes.

3. Significance and Use

3.1 This practice is intended to define 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 automotive polish on what properties or performance characteristics are best for their products. This practice is flexible enough to honor this fact within the confines of the automotive polish definition below.

3.2 The test methods are subjective and empirical in order to conform to the basic characteristics of the industry and to allow flexibility in testing.

4. Apparatus and Materials

4.1 *Sample of Polish* to be tested.

4.2 *Sample of Control Polish*—The control polish is selected subjectively for comparison to the test polish. It may be a competitive product, a modified formulation of the test polish, etc. It should be recognized that automotive polishes are formulated to perform different functions. This should be taken into account when interpreting results and choosing the control polish.

4.3 *Test Substrates*—The test substrate shall be one for which the test polish is intended (Note 1). The test surface shall be in good physical condition, not badly cracked, scratched, or otherwise damaged so as to interfere with evaluation of polish properties. The minimum test surface area for each sample shall be 1290 cm^2 (200 $in.^2$).

NOTE 1—It is important to select a test substrate for which a particular polish is intended. For example, if a particular polish is intended for a certain make of car only, then the test substrate should be similar.

NOTE 2—Standard paint panels that were previously available through ASTM have been discontinued as of January 1, 1988. It became very difficult to maintain paint panels that were representative of all current and past paint technologies used to manufacture automotive finishes. Since 4.3 requires that the test substrate be one for which the test polish is intended, it is in the best interest of the user of this practice to determine and obtain the appropriate test surface or coating, or both. ASTM Committee D-21 on Polishes suggests if further assistance is needed in determining or obtaining appropriate test substrates that contact be made with automotive paint manufacturers, automobile manufacturers, and/or re-painting technology specialists.

4.4 *Polishing Cloth*—The same type and size 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*:

4.5.1 Aliphatic solvents with kauri butanol values less than 38.

4.5.2 Water/isopropanol (70/30).

4.6 *Eye Droppers and Distilled or Deionized Water*.

4.7 *Masking Tape*, with a 9.5-mm (⅜-in.) 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 13 to 29°C (55 to 85°F) with a relative humidity of 20 to 80 %.

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

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[1] This practice is under the jurisdiction of ASTM Committee D-21 on Polishes and is the direct responsibility of Subcommittee D21.04 on Performance Tests.

Current edition approved Nov. 15, 1994. Published January 1995. Originally published as D 3836 – 79. Last previous edition D 3836 – 89a.

6. Personnel and Instructions

6.1 The application and evaluation of the test and control polishes 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 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 rate ease of use and other application properties. This means there will be only four readings on application properties. The three rating the other polish properties do not observe the application because they rate properties of each polish "blind."

NOTE 3—For intralaboratory and development work the observations of an individual experimenter may be substituted as long as the decrease in accuracy is considered.

7. Procedure

7.1 *Cleaning of Test Substrates*—Using soft cotton towels, first clean the test substrate thoroughly with an aliphatic solvent having a kauri butanol value less than 38. Wipe dry. Using new soft cotton towels, reclean with a water/isopropanol solvent mixture (70/30). Wipe dry with a clean soft cotton towel.

NOTE 4—If polishes containing resins or reactive polymers, or both, or unknown polishes have been previously used on the test substrate, preclean with an abrasive cleaner to ensure their complete removal.

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

7.3 *Application of Polish*—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. Equal volumes of control and test polish shall be used to avoid excessively thin or heavy coats of polish. 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 polish and the control polish.

8. Placement of Polishes

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

Test Panel	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 Panel	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 and the control.

9.2 *Application Properties*—During the application of the polish begin the first phase of evaluation. In each case compare the test polish and the control. Evaluate all or any number of the following properties:

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

9.2.2 *Cleaning*—Following the application of the polishes inspect the discoloration, if any, on applicators (towels). Also note the effect of applying the polishes on the test surfaces.

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

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

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

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

9.3 *Final Properties*—Five to ten minutes following the second phase of the application of the polishes, begin the evaluation. In each case compare the test polish and the control. Evaluate all or any number of the following properties:

9.3.1 *Gloss*—Evaluate as depth of gloss.

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

9.3.3 *Distinctness of Image*—Observe the clearness or sharpness of an image of an object in the polished surface. Overhead lights, face, hand, 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 is rubbed up to the desired polish appearance. Mar is the degree of film damage resulting from a glancing blow to the polish substrate. Check smear by making a design such as an "S" with a smoothly rounded object (finger or glass or metal rod) wrapped in a soft cotton cloth. A glancing blow with knuckles or a 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 9.3.4 to disappear from the polish film.

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 *Cleaning*—Observe the ease of removal of old polish films as well as common soiling materials such as dust, grease, oils, finger marks, tree sap, etc. This may be done either in the laboratory or during actual use trials of the products. In the laboratory, removal of old polish may be determined by applying multiple coats (10 to 20 applications) and determining polish buildup. A polish showing little buildup would be rated

a good cleaner for old polish. Other materials, such as greases, oils, tree sap, etc., should be tested on an individual basis.

9.3.8 *Water Spotting*—At least 2 h (Note 3) after application of the polishes, place at random to the polished surfaces several spots of water about the size of a penny. Allow the water to remain on the surface for 5 min, 15 min, 30 min, and 1 h. At precise intervals, blot the water with a paper towel or other absorbent material. DO NOT WIPE. Observe the presence and degree of film damage. Other materials such as 2 % salt solution, tree sap, etc., may be used to supplement the water test.

NOTE 5—Under operating conditions at the extremes specified in 5.1, additional time may be required.

9.3.9 *Gloss Retention*—Observe the degree of gloss of a freshly applied polish film compared to that of an aged polish film.

9.3.10 *Dust Attraction*—Carefully remove all dust and dirt from the polished substrate. Expose the test substrate to accumulate dust using a method of choice. Make observations for dust buildup after 1, 2, 3, and 7 day aging.

10. Report

10.1 *Method A*—Using Method A (8.1), 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 judgmental value system for each test surface evaluated based on each individual rater's own reference scale. Since 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 the 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,
F_c = rating factor for control polish,
X_{property} = sum of all readings of a specific property for the test polish,
C_{property} = sum of all readings of a specific property for the control polish,
n = number of observations, and

$$F = \frac{X_{\text{property}}}{n}$$

$$F^c = \frac{C_{\text{property}}}{n}$$

10.2 *Method B*—Using Method B (8.2), rate all properties 1 to 5 with the control surface always given 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

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

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

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

NOTE 1—Designate the position of the product (X or C) in the box designating the position on the test panel; for example: *left*, *center*, or *right*.

FIG. 1 Automotive Polish Evaluation—Individual Ratings for 10.1.1.

Products Compared

Surfaces Used for Testing

Temperature _____ Relative Humidity _____

Date _____ Evaluator _____

Properties	Summary of Product (X) Properties			Summary of Control (C) Properties		
	n	$X_{properties}$	F	n	$C_{Properties}$	F_c

FIG. 2 Automotive Polish Evaluations—Summary of Individual Ratings for 10.1.1.

4 = slightly better than control

5 = significantly better than control

This value system is a paired comparison with the control surface always acting as the point of reference. Since the three individuals rating the final properties need the control surface to be identified, to prevent bias the identification of the control product must not be revealed.

10.2.1 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,

X_{property} = term of all readings for a specific property for the test polish,

N = number of observations, and

$$F = \frac{X_{\text{properties}}}{n}$$

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

10.2.2 Record temperature and relative humidity which 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*—(Same as Method A). However, since 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 automotive polish

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 Automotive Polish Evaluation—Individual Ratings for 10.2.1

Products Compared

Surfaces Used for Testing

Temperature _____ Relative Humidity _____

Date _____ Evaluator _____

Properties	Summary of Test Product Properties			Summary of Control Product Properties
	n	$X_{Properties}$	F	F_c
				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 Automotive Polish Evaluation—Summary of Individual Ratings for 10.2.2.