



Standard Practice for Conducting Road Service Tests on Fluid Traffic Marking Materials¹

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1. Scope

1.1 This practice covers the determination of the relative service life of fluid traffic marking materials such as paint, thermoplastic, epoxy, and polyester products under actual road conditions using transverse test lines. Materials under test are applied under prescribed conditions and periodic observations are made using prescribed performance criteria.

1.2 The values stated in inch-pound units are to be regarded as the standard. The values given in parentheses are for information only.

1.3 *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:

- D 711 Test Method for No-Pick-Up Time of Traffic Paint²
- D 913 Test Method for Evaluating Degree of Resistance to Wear of Traffic Paint²

3. Significance and Use

3.1 This practice is an accelerated evaluation of bead retention and wear characteristics of fluid traffic marking materials. It is used to determine the useful life of such markings in the field. The same procedures are applicable to evaluating longitudinal lines to determine service life.

4. Type and Location of Pavement for Tests

4.1 Select sections where traffic is moderate and free-rolling with no grades, curves, intersections, or access points near enough to cause excessive braking or turning movements, where wear is uniform with full exposure to the sun throughout daylight hours, and there is good drainage. Select surfaces that are representative of the pavements upon which the fluid traffic marking material will be used in practice. Such surfaces include portland cement concrete, sheet asphalt, bituminous

concrete, rock asphalt, and bituminous surface treatment.

5. Conditions at Time of Application

5.1 Clean the test area thoroughly of all foreign material. Do not apply traffic paint when the pavement surface is damp or wet nor when the pavement temperature is below 50°F (10°C). Application between 10 a.m. and 3 p.m. is recommended. During application record air and pavement temperature hourly.

6. Measurement of Wet Film Thickness

6.1 To aid in obtaining the correct film thickness, a length of roofing paper placed by the side of the road can be used. Place a rigid metal test panel on the roofing paper and in the path of the test line. A 12 by 12-in. (300 by 300-mm) metal panel 1/16 in. (1.5 mm) in thickness is satisfactory. Immediately after the test line is applied by the motorized striper, read the wet film thickness. If the wet film thickness is not satisfactory, adjust the spray pressure and repeat until the target wet film thickness is attained. It is important that no glass beads or other interfering materials be present that would give a false wet film reading. When the wet film thickness is correct, apply a test line across a tared metal panel and weigh immediately. A balance must be immediately available and be thoroughly shielded from wind as well as be of 1500-g capacity with 0.1 g or better sensitivity. As a basis for determination of glass bead application (7.1) the weight of a paint line 4 by 12 in. (100 by 300 mm) (without consideration for solvent loss) can be calculated as follows:

$$W = 0.0943 \times t \times g \quad (1)$$

where:

- W = weight of paint line, g,
- t = mil thickness, and
- g = weight per gallon, lb.

7. Measurement of Glass Beads

7.1 After the completion of 6.1, apply another test line to a tared panel with the motorized striper, this time also adding the glass beads, and weigh immediately. The weight difference between this measurement and that in 6.1 gives the amount of glass beads on the panel. The process can be repeated if an adjustment in the bead application rate is needed. The weight of applied glass beads can be calculated as follows:

$$W = 1.418 \times B \quad (2)$$

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² Annual Book of ASTM Standards, Vol 06.02.

where:

W = weight of glass beads, g, and

B = glass beads per gallon of paint, lb.

8. Application Procedure

8.1 Apply the test stripes 4 in. (100 mm) in width and transversely on the road. At the option of the purchaser, the test stripes may be applied to the pavement at an angle of 45° to the direction of the traffic, or longitudinally in each wheel path, in order to increase the area of contact with traffic.

8.2 Apply test stripes (trained personnel under the supervision of the purchaser) by using a pavement-marking machine similar to the production pavement marking equipment. Apply the test stripes to at least two sections of each road surface selected to ensure against undetected road surface problems. When more than one specimen is tested at more than one location, change the sequence of placement to minimize the effect of time of day and time period before the test deck is opened to traffic.

8.3 Apply at least two lines of each specimen in each section for better statistical reliability. A tared panel as used in the measurement of glass beads (see 7.1) should be placed between the wheel track of one line's application as a double check for material and glass bead application rates. Weights between this reading and that found in 7.1 should agree within 0.5 g. The purchaser may wish to place another smaller panel between the wheel tracks to retain for future reference.

8.4 The road surface test lines should have a wet film thickness within ± 0.5 mil of that required by the purchaser.

NOTE 1—If no wet film thickness is specified, 15.0 mil is recommended.

8.5 A fluid marking material with which the purchaser has had considerable production experience is included in the test series as a control.

8.6 Glass beads are placed in the paint film within ± 0.5 lb/gal of that required by the purchaser. All glass beads are supplied by the purchaser.

NOTE 2—If no bead application rate is specified, 6.0 lb/gal of paint is recommended.

9. Performance Criteria

9.1 *Auto-No-Track Time*—The auto no-track time is determined by passing over the freshly applied line in a simulated passing maneuver with a standard size passenger car with regular treads (no snow treads). A line showing no visual pick-up and redeposition of the materials onto the pavement surface when viewed from a distance of 50 ft (15 m) in the highway direction is considered as showing no pick-up and conforming to the drying time requirements.

9.1.1 The test line is applied at the same temperature, the same wet film thickness, and the same rate of glass beads as will be specified by the purchaser in production application.

9.1.2 The no-track maximum time is measured when the pavement temperature is from 60 to 120°F (15 to 50°C) and under local humidity conditions, providing that the pavement is dry.

NOTE 3—A laboratory no-track test is described in Test Method D 711. This test is a laboratory control test and has little or no correlation with

field results. Some paints have a tendency to skin over rapidly allowing the specimen to meet the maximum specified time for the laboratory test, but would be unsatisfactory at that time on a road surface.

9.2 *Appearance*—The impression of the observer of the general condition of the test lines when viewed without any detailed inspection, from a distance of at least 10 ft. It is a measure of satisfactory or unsatisfactory appeal to the observer. It includes a comparison of the color of the surface under consideration with the original color, taking into account changes due to yellowing, bleeding, darkening, fading, dirt collection, mold growth, etc. This determination is made in each wheel track in an area extending 9 in. (229 mm) each side of the point of greatest wear. The appearance is rated either acceptable or unacceptable.

9.3 *Durability*—The durability is equal to one tenth of the percentages of material remaining on the pavement (when examined by the unaided eye). This determination is made in each wheel track in an area extending 9 in. (229 mm) each side of the point of greatest wear. The percent of paint remaining on the pavement is considered as the percent of the prescribed area of test stripe in which the substrate is not exposed. Make the evaluations in accordance with Test Method D 913.

NOTE 4—In the absence of a specification by the purchaser, failure shall be a rating less than 4 (less than 40 % material remaining on the pavement).

9.4 *Night Visibility*—Night visibility designates the apparent brightness when examined at night under tungsten illumination from the side of the road, with eye and light source separated by 1½ in. (40 mm) that corresponds to an observation angle of approximately ½°. Night visibility determinations are made in the wheel track areas used for rating durability, and are based on a factor of 10 for an unexposed standard panel placed next to the test stripe and 0 for no apparent brightness.

NOTE 5—In the absence of a specification by the purchaser, failure shall be a rating less than 4.

NOTE 6—A new test method for night visibility using a retro-reflectometer is being developed which is expected to have much greater precision.

9.5 *Length of Useful Life*—The length of useful life is determined by the number of days of duration between the date the sample was applied to the road surface and the date any one of the designated measurements falls below the specified minimum rating.

10. Evaluation Procedure

10.1 Make periodic inspections of the test sections in accordance with 9.2, 9.3, and 9.4. Record at each inspection the general daytime appearance (including color), film condition, and night visibility (retro-reflectance).

10.2 Inspect the test lines at regular monthly intervals. As the test lines approach failure, they should be evaluated every 2 weeks (weather permitting). The test lines must be evaluated until failure. Different types of traffic paint and markings do not wear out in a linear manner. Hence, it is not possible to extrapolate to failure some intermediate data. The winter season is also a must when evaluating test lines.

11. Calculation

11.1 Make cost calculations as follows:

$$C = M/L \times F \quad (3)$$

where:

C = cost per foot per day of useful life,

M = cost of paint per gallon,

L = length of useful life in days as previously observed,
and

F = feet per gallon actually applied.

NOTE 7—The cost of the glass beads is usually not included in the calculation because it will be a constant when comparing the relative performance of a specified class of paint. Various types of paints and other fluid marking materials, however, can have different bead wetting characteristics, and beads with different wetting characteristics also are available, either of which could influence the useful life of the line. When

testing more than one type of material or one type of bead, the optimum cost/performance may be at a different bead application rate than that recommended in 8.6.

11.2 To determine the relative performance of the different fluid traffic marking materials during the course of the test, the following weighted rating, R , can be used:

$$R = 0.30A + 0.30D + 0.40N \quad (4)$$

where:

A = appearance as defined in 9.2 and determined using a rating from 0 to 10,

D = durability as defined in 9.3, and

N = night visibility as defined in 9.4.

12. Keywords

12.1 road tests; traffic paint

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