



Florida Test Method for Friction Measuring Protocol for Patterned Pavements

Designation: FM 5-592

1. SCOPE

This method covers the testing procedures for evaluating the friction resistance of Patterned surfaces used in crosswalks over asphalt and concrete surfaces.

This test method contains two parts:

Part A - Friction testing performed with the Locked Wheel Friction Tester

Part B - Friction testing performed with the Dynamic Friction Tester (DFT)

2. APPARATUS

2.1 Locked Wheel Friction Tester - This apparatus shall be standardized in accordance with ASTM E274, "Standard Test Method for Skid Resistance of Paved Surfaces Using a Full-Scale Tire". The friction test tire used shall be in accordance with ASTM E501, "Standard Specification for Standard Rib Tire for Pavement Skid-Resistance".

2.2 Dynamic Friction Tester - This apparatus shall be standardized in accordance with ASTM E1911, "Standard Test Method for Measuring Paved Surface Frictional Properties Using the Dynamic Friction Tester".

3. FRICTION NUMBER CONVERSION

The regression equations relating the locked wheel test results and the DFT results at 40 mph (65 km/h) are:

$$FN40R = 0.64 \cdot DFT40 + 9.23 \quad (1)$$

$$DFT40 = 1.56 \cdot FN40R - 14.42 \quad (2)$$

where,

FN40R = Friction Number from locked wheel testing at 40 mph using a ribbed tire
DFT40 = Coefficient of Friction from DFT at 40 mph multiplied by 100.

Although the above equations can be used to convert the DFT result to the locked wheel friction number at 40 mph and vice versa, conditions do exist where the DFT testing or the locked wheel testing at 40 mph is not feasible due to constraints such as safety, traffic congestion, speed limits, and/or roadway geometries. In these cases, it may be preferable to conduct the locked wheel testing at a slower speed, e.g., 20 or 30 mph. The following regression equations have been developed to convert the locked wheel test results at 20 and 30 mph to those at 40 mph:



$$FN40R = 0.89 \cdot FN20R - 4.88 \tag{3}$$

where,

FN20R = Friction Number from locked wheel testing at 20 mph using a ribbed tire, and

$$FN40R = 0.95 \cdot FN30R - 2.91 \tag{4}$$

where,

FN30R = Friction Number from locked wheel testing at 30 mph using a ribbed tire.

For ease of application of the above harmonization results, Table 1 summarizes the conversions from FN30R, FN20R and DFT40 to FN40R. Note that the friction numbers shown in this table were rounded to the closest integer. The numbers highlighted in yellow represent the current minimum required friction numbers depending on survey cycle, test method, and speed evaluated.

Table 1. Friction Number Table

FN40R	FN30R	FN20R	DFT40
22	26	30	20
23	27	31	21
24	28	32	23
25	29	34	25
26	30	35	26
27	31	36	28
28	33	37	29
29	34	38	31
30*	35*	39*	32*
31	36	40	34
32	37	41	36
33	38	43	37
34	39	44	39
35**	40**	45**	40**
36	41	46	42
37	42	47	43
38	43	48	45
39	44	49	46
40	45	50	48
41	46	52	50
42	47	53	51



43	48	54	53
44	49	55	54
45	50	56	56

* Minimum friction numbers required for inventory cycles of patterned crosswalks.

**Minimum friction numbers required for new construction and 3-year APL test decks for patterned crosswalks.

4. PROCEDURE

The test procedures for both the Locked Wheel Friction Tester and the Dynamic Friction Tester are described in the following. All testing should be performed within either the driver or passenger side wheel path, regardless of the equipment used.

4.1 PART A- Friction Testing with the Locked Wheel Friction Tester

- A) **New Construction** – The locked wheel test shall be conducted on all crosswalks within 60 days of the new surface completion date. One valid lockup test is required for each lane; all lanes shall be evaluated and compared. The test layout is shown in Figure 1.
- B) **Inventory** – For in-service Approved Product List (APL) test sections, the locked wheel test is conducted at 6-month intervals up to 3 years. Maintenance surveys are conducted on a yearly basis. Test site shall be confined to a single outside traffic lane (single direction) for each crosswalk location. The locked wheel test will require three repeat lockups and averaged for the designated test lane. The lane in which the friction tests were conducted must be identified in the report along with the test results.
- C) **Retest** – At any point when friction numbers are determined to be below the required values shown in Table 1, all lanes shall be evaluated, and the range of friction values shall be determined.
- D) **Special Request** – At any time, a patterned pavement is in need of a special assessment, the designated lane(s) shall be evaluated to determine the range of representative friction values.

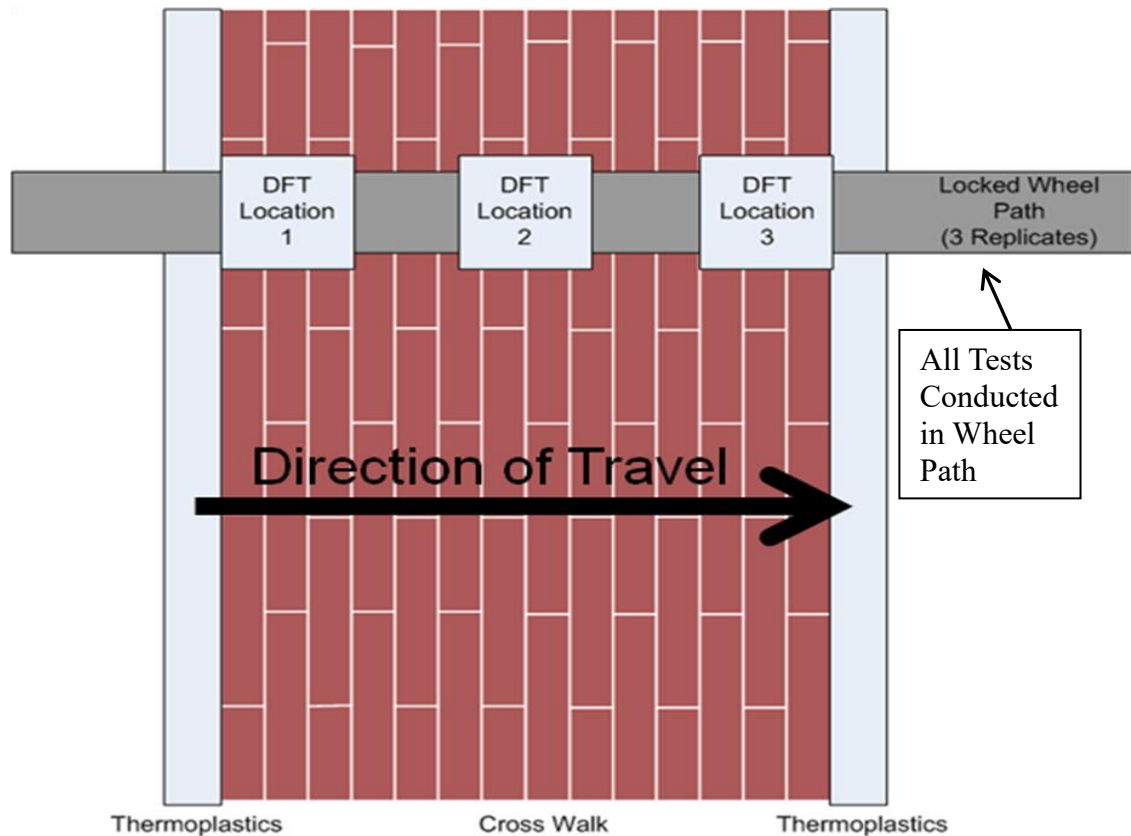


FIGURE 1 Testing protocol for patterned pavement.

4.2 PART B- Skid Testing with the Dynamic Friction Tester (DFT)

- A) **New Construction** – The DFT test shall be conducted on all crosswalks within 60 days of the new surface completion date. DFT tests shall be conducted at three (3) discrete locations in each lane; the results shall be averaged and reported for each lane tested. All lanes shall be evaluated and compared. The test layout is shown in Figure 1.
- B) **Inventory** – For in-service APL test sections, the DFT test is conducted at 6-month intervals up to 3 years. Maintenance surveys are conducted on a yearly basis. Test site shall be confined to a single outside traffic lane (single direction) for each crosswalk location. DFT tests will be conducted at three (3) discrete locations (Figure 1) in each lane; the results shall be averaged and reported for each lane tested. The lane in which the friction tests were conducted should be identified in the report with the test results.
- C) **Retest** – At any point when friction numbers are determined to be below the required values shown in Table 1, all lanes shall be evaluated, and the range of friction values shall be determined.



- D) **Special Request** – At any time, a patterned pavement is in need of a special assessment, the designated lane(s) shall be evaluated to determine the range of representative friction values.

5. TEST SITE SELECTION REQUIREMENTS

Manufacturers shall provide a field service test installation of each product within a marked crosswalk on a roadway with an ADT of 6,000 to 12,000 vehicles per day per lane, on a site approved by the Department. The test installation shall be a minimum six feet wide and extend from pavement edge to pavement edge across all traffic lanes and shoulder pavement at the crosswalk location.

6. REPORTING

- 6.1 Friction numbers for the patterned crosswalks should be reported using FDOT's Materials form number 675-060-05. This form can be downloaded from FDOT's website at:

<https://pdl.fdot.gov/api/form/downloadAttachment/10981075>