

**PAVEMENT TECHNOLOGY ADVISORY
- TESTING PAVEMENT FRICTION -
PTA-T3**

FRICTION TESTING PROCEDURE

The Illinois Department of Transportation (IDOT) uses friction testers like the one shown in Figure 1 to obtain a standard measurement of pavement surface friction under wetted conditions.



Figure 1: Friction Tester

The two-wheeled trailer is towed along the roadway at a predetermined test speed. The test starts when a measured amount of water is sprayed on the pavement in front of one of the tires. A split second after the water is sprayed, that wheel of the trailer is locked by braking. As the tire slides along the wetted surface, friction is generated between the tire and the pavement surface, causing a torque to be developed on the trailer axle. This torque is measured, and friction numbers (FN) representing the frictional properties of the pavement are calculated. These numbers are used to evaluate the skid resistance of the pavement.

A standard test is made at 40 mph in the left wheel path with a treaded tire. The test takes about 3 seconds. Torque on the trailer axle is measured for a 1-second

interval. IDOT also performs a test in the right wheelpath with a smooth (treadless) tire. Treaded tire friction numbers are referred to as FN_t and smooth tire numbers as FN_s . Tests are made by alternating wheels as the trailer is towed along the roadway. The FN data is then stored in a personal computer.

FN_t is a measure of pavement microtexture, which is the quality of aggregates making them feel rough or smooth. Rough surfaces are better able to penetrate the water film, permitting more contact between the tire and the roadway. FN_s is a measure of pavement macrotexture, which is the frictional characteristic that provides a drainage escape path between the tire and the pavement. Both macrotexture and microtexture are needed to make a frictionally adequate pavement. FN_t and FN_s can range between 1 and 100, with higher FN values indicating better skid resistance.

TESTING CATEGORIES

The Bureau of Materials and Physical Research (BMPR) carries out testing programs based on federal guidelines and departmental policy. There are four categories of friction testing:

1. **HA** are wet weather accident locations. 100% of these sites are tested. Results of these tests are sent to the District Operations office.
2. **NC** are new construction and pavement rehabilitation sites. BMPR tests a portion of all new pavement

surfaces completed within a year. BMPR also chooses some projects as research projects based on the materials and construction methods used. Results of these tests are sent to the District Materials office.

3. **RR** are reruns of previous test sites. BMPR selects pavements that contain surfaces with each type of aggregate and blend used in IDOT hot-mix asphalt designs. These sites are retested every other year until they are overlaid. At that point, IDOT chooses a replacement section and continues testing. Results of these tests are sent to the District Materials office.
4. **MS** are miscellaneous test requests. The miscellaneous category is assigned to a section when the construction contract number is not known. This category is also assigned to special requests. The results of these tests are sent to either the individual requester, or the District Materials office.

PRIMARY INFLUENCES ON FN

- Surface course age: There is a rapid increase in FN after construction followed by a leveling out at a fairly steady average.
- Traffic: Changes in traffic volume or composition result in fluctuations in FN with time.
- Seasonal changes: FN is usually at a maximum value in the spring and decreases to a minimum value in the fall. Tests cannot be performed when the outside air temperature is below freezing.
- Speed: FN decreases as test speed increases.

CATEGORICAL RATING GUIDELINES

1. If $FN_t \leq 30$ or $1 \leq FN_s \leq 15$, then: **Friction may be a factor** contributing to wet weather accidents.

2. If $FN_t > 30$ and $16 \leq FN_s \leq 25$, or if $31 \leq FN_t \leq 35$ and $FN_s > 25$, then: **Uncertain if friction is a factor** contributing to wet weather accidents.
3. If $FN_t > 35$ and $FN_s > 25$, then: **Friction may not be a factor** contributing to wet weather accidents.

Note: Pavement safety cannot be evaluated using only FN. The level of FN needed at each site is dependent upon the traffic demands and geometrics at that site. Each site should be evaluated independently.

TESTING REQUESTS

BMPR has a limited amount of test time available, and tests can only be performed when the air temperature is at least 40°F and rising. Please contact the Pavement Technology Engineer for testing availability before submitting a request. To request a friction test, please submit the following information to BMPR:

- Marked route
- Contract and section number (if available)
- Location map (REQUIRED)
 - Cover map from plans for new construction and rehabilitation projects
 - County or city map for any other request
- Pavement type
- Name and telephone number of test requester
- Mix design
 - MISTIC ID number
- ADT

Please direct questions or requests to:

Pavement Technology Engineer
Bureau of Materials
and Physical Research
126 East Ash Street
Springfield, IL 62704-4766
(217) 782-7200