Illinois Modified Test Procedure
Effective Date: January 1, 2002
Revised Date: May 13, 2022

Standard Method of Test
for
Density of Bituminous Concrete in Place by Nuclear Methods

Reference ASTM D 2950-14

ASTM Section	***Illinois Modification***
2.1	Replace the individual Standards as follows: IL Modified ASTM Standards in the Illinois Department of Transportation *Manual of Test Procedures for Materials* (current edition)
3.5	Replace with the following: The density results obtained by this test method are relative. If an approximation of core density results is required, a correlation factor will be developed to convert nuclear density to core density by obtaining nuclear density measurements and core densities at the same locations. The Department's "Procedure for Correlating Nuclear Gauge Densities with Core Densities for Hot-Mix Asphalt" shall be used to determine the appropriate correlation. It may be desirable to check this factor at intervals during the course of the paving project. A new correlation factor should be determined when there is a change in the job mix formula (outside the allowable adjustments); a change in the source of materials or in the materials from the same source; a significant change in the underlying material; a change from one gauge to another; or a reason to believe the factor is in error.
3.6 New Section	All projects containing 2750 metric tons (3000 tons) or more of a given mixture will require a correlation factor be determined and applied for measurement of density testing.

Illinois Modified Test Procedure
Effective Date: January 1, 2002
Revised Date: May 13, 2022

Standard Method of Test
for
Density of Bituminous Concrete in Place by Nuclear Methods

Reference ASTM D 2950-14

ASTM Section	***Illinois Modification***
3.7 New Section	Definitions: Density Test Location: The random station location used for density testing. Density Reading: A single, one minute nuclear density reading. Individual Test Result: An individual test result is the average of three to five nuclear density readings obtained at each random density test location. One to three "individual test results" will be required per "density test location" depending on the following conditions: • If two confined edges are present, one "individual test" result representing all five density readings across the mat shall be reported. (Confined edge density readings are included in the average.) • If one confined and one unconfined edge is present, two "individual test results" shall be reported for each density test location. ○ One "individual test result" representing the average of four density readings across the mat, including the one confined edge and excluding the unconfined edge density readings. ○ One "individual test result" representing the average of three density readings on the unconfined edge. • If two unconfined edges are present, three "individual test" results shall be reported for each density test location. ○ One "individual test result" representing the average of three density readings across the mat, excluding the unconfined edge density readings. ○ One "individual test result" representing the average of three density readings on the unconfined edge. ○ One "individual test result" representing the average of three density readings on the opposite unconfined edge. Daily Average Density Value: The "daily average density" is the average of the "density readings" of a given offset for the given day's production. Density Test Site: Correlation term use to describe each physical location the nuclear density gauge is placed where a density value is determined. Density Value: Correlation term used to describe the density determined at a given density test site from the average of two or potentially three readings.

Illinois Modified Test Procedure
Effective Date: January 1, 2002
Revised Date: May 13, 2022

Standard Method of Test
for
Density of Bituminous Concrete in Place by Nuclear Methods

Reference ASTM D 2950-14

ASTM Section	***Illinois Modification***
4.2.1	Add the following at the end: The user should recognize that density readings obtained on the surface of thin layers of hot-mix asphalt (HMA) may be erroneous if the density of the underlying material differs significantly from that of the surface course.
4.2.2	Add the following at the end: Accuracy of the nuclear density test is affected by the surface texture and thickness of the mixture and most significantly affected by the underlying material. The number of tests required to determine a satisfactory factor are dependent on the conditions stated above.
4.5	Replace with the following: If samples of the measured material are to be taken for purposes of correlation with other test methods, the procedures described in the Department's "Procedure for Correlating Nuclear Gauge Densities with Core Densities for Hot-Mix Asphalt" shall be used.
5.5 New Section	*Readout Instrument,* such as scaler or direct readout meter.
7.1	Add the following at the end: Dated inspection reports shall be kept and be made available to the Engineer upon request.
7.1.1 New Section	The calibration check shall provide proof of five-block calibration. Calibration standards shall consist of magnesium, magnesium/aluminum, limestone, granite, and aluminum. All calibration standards should be traceable to the U.S. Bureau of Standards. Proof shall consist of documented and dated calibration counts accompanied by copies of an invoice from the calibrating facility.
7.1.2 New Section	At least once a year and after all major repairs which may affect the instrument geometry, the calibration curves, tables, or equation coefficients shall be verified or reestablished.

Illinois Modified Test Procedure
Effective Date: January 1, 2002
Revised Date: May 13, 2022

Standard Method of Test
for
Density of Bituminous Concrete in Place by Nuclear Methods

Reference ASTM D 2950-14

ASTM Section	***Illinois Modification***
8.2.1	Replace with the following: The reference standard count shall be taken a minimum of 10 m (30 ft.) from another gauge and a minimum of 5 m (15 ft.) away from any other masses or other items which may affect the reference count rate. In addition, the reference count shall be taken on material 1510 kg/m^3 (100 lbs./$ft.^3$) or greater.
8.2.2	Revise the first sentence as follows: Turn on the apparatus prior to standardization and allow it to stabilize, a minimum of 20 minutes.
8.2.3	Replace with the following: All reference standard counts shall consist of a 4-minute count.
8.2.4	Replace with the following: The density reference standard count shall be within 1 percent of the average of the last four daily reference standard counts.
8.2.5 New Section	If four reference standard counts have not been established, then the reference standard count shall be within 2 percent of the standard count shown in the count ratio book.
8.2.6 New Section	If the reference standard count fails the established limits, the count may be repeated. If the second count fails also, the gauge shall not be used. The gauge shall be adjusted or repaired as recommended by the manufacturer.
8.2.7 New Section	Record all daily reference standard counts in a permanent-type book for a gauge historical record. This also applies to direct readout gauges.
8.3	Delete the first sentence.
9.1	Revise as follows: In order to provide more stable and consistent results: (1) turn on the instrument prior to use to allow it to stabilize, a minimum of 20 minutes; and (2) leave the power on during the day's testing.

Illinois Modified Test Procedure
Effective Date: January 1, 2002
Revised Date: May 13, 2022

Standard Method of Test
for
Density of Bituminous Concrete in Place by Nuclear Methods

Reference ASTM D 2950-14

ASTM Section	***Illinois Modification***
9.3	Replace with the following: Select a test location, using the Department's "Hot-Mix Asphalt QC/QA Procedure for Determining Random Density Locations". Each random density test site location shall consist of five equally spaced nuclear density offsets across the mat. These density offsets shall be positioned to provide a diagonal configuration across the mat. The outer density offsets shall be located at a distance equal to the lift thickness or a minimum of 2 in. (50 mm), from the edge of the mat, whichever is greater. • If the edge is unconfined, an “individual test result” shall represent the average of three “density readings” spaced 10 feet apart longitudinally along the unconfined edge. • If the edge is confined, the density reading will be averaged with the remaining offset “density readings” to provide an “individual test result” representing everything except unconfined edges.

Illinois Modified Test Procedure
Effective Date: January 1, 2002
Revised Date: May 13, 2022

Standard Method of Test
for
Density of Bituminous Concrete in Place by Nuclear Methods

Reference ASTM D 2950-14

ASTM Section	***Illinois Modification***
9.4	Replace with the following: Maximum contact between the base of the instrument and the surface of the material under test is critical. Since the measured value of density by backscatter is affected by the surface texture of the material immediately under the gauge, a smoothly rolled surface should be tested for best results. A filler of limestone fines or similar material, leveled with the guide/scraper plate, shall be used to fill open surface pores of the rolled surface.
9.5	Replace with the following: Place the source in the proper position. All other radioactive sources shall be kept at least 10 m (30 ft.) from the gauge so the readings will not be affected.
9.6	Delete
9.7	Delete.
9.8	Delete.
Note 6	Delete.
Note 7	Delete.
10.1	Delete.
10.1.1	Delete.
10.2	Delete.

Illinois Modified Test Procedure
Effective Date: January 1, 2002
Revised Date: May 13, 2022

Standard Method of Test
for
Density of Bituminous Concrete in Place by Nuclear Methods

Reference ASTM D 2950-14

ASTM Section	***Illinois Modification***
11.1.1	Replace with the following: Gauge number,
11.1.2	Revise as follows: Date of calibration data,
11.1.5	Revise as follows: Density test site description as follows: (1) project identification number, (2) location, including station and reference to centerline, (3) mixture type(s), including mix design number and surface texture, e.g., open, smooth, roller-tracked, etc., and (4) number and type of rollers
11.1.6	Replace with the following: Layer (bottom lift = .1, second lift = .2, etc.) and thickness of layer,

This Page Reserved