



**INDIANA DEPARTMENT OF TRANSPORTATION
DIVISION OF MATERIALS AND TESTS**

**VERIFYING VACUUM CHAMBERS
ITM No. 905-16**

1.0 SCOPE

- 1.1** This test method covers the procedure for verifying the vacuum chambers used in AASHTO T 331 and ITM 572. It also provides a procedure for verifying the digital gauge used in AASHTO T 209 with either a mercury manometer or National Institute of Standards and Technology (NIST) traceable digital gauge as the measurement standard.
- 1.2** This ITM may involve hazardous materials, operations, and equipment and may not address all of the safety problems associated with the use of the test method. The user of the ITM is responsible for establishing appropriate safety and health practices and to determining the applicability of regulatory limitations prior to use.

2.0 REFERENCES

2.1 AASHTO Standards.

- T 209 Theoretical Maximum Specific Gravity and Density of Bituminous Paving Mixtures
- T 331 Bulk Specific Gravity and Density of Compacted asphalt Mixtures Using Automatic Sealing Method

2.2 ASTM Standards.

- D7227 Rapid Drying of Compacted Asphalt Specimens Using Vacuum Drying Apparatus

2.3 ITM Standards.

- 572 Drying HMA Mixtures

- 3.0 TERMINOLOGY.** Definitions for terms and abbreviations shall be in accordance with the Department's Standard Specifications, Section 101.

4.0 SIGNIFICANCE AND USE. This ITM is used by laboratory personnel to standardize the vacuum chambers used in AASHTO T 331 and ITM 572. It can also be utilized to verify the digital vacuum gauge used in AASHTO T 209 using a mercury manometer or a NIST traceable calibrated digital gauge the measurement standard.

Note 1—Measurement Standard is defined as a device infrequently used only for the standardization of other devices and not used in the day to day operations of the laboratory.

5.0 APPARATUS.

- 5.1** Mercury absolute pressure manometer (note: mercury manometers do not have to be calibrated)
- 5.2** NIST traceable digital gauge capable of measuring vacuum down to 25 mm Hg measurement standard¹ calibrated annually
- 5.3** Vacuum Gauge measurement standard¹, capable of being placed inside the vacuum chamber, and having a minimum range of 10 to 0 mm Hg that is readable to a minimum of 1 mm Hg. The gauge shall be NIST traceable and calibrated annually

6.0 PROCEDURES.

6.1 Vacuum Chamber (AASHTO T 331 and ITM 572).

- 6.1.1** Record the identification number and date of calibration of the measurement standard vacuum gauge
- 6.1.2** Record the identification number of the device being standardized
- 6.1.3** Place the vacuum gauge inside the vacuum chamber
- 6.1.4** Start the apparatus and allow the vacuum to remove the air from the vacuum chamber
- 6.1.5** Record the reading on the vacuum gauge at the maximum vacuum level achieved

6.2 Verifying a Digital Gauge using a Mercury Manometer or a Measurement Standard Digital Gauge (T 209)

- 6.2.1** If a mercury manometer is used inspect it for mercury separation
- 6.2.2** Record the identification on both devices

- 6.2.3** Plumb the vacuum system with a two way splitter off of the pycnometer lid with one line going to the digital gauge being verified and the other line going to the mercury manometer or measurement standard digital gauge
- 6.2.4** Place the lid on the pycnometer and start the vacuum system. Stabilize the mercury manometer or measurement standard gauge and verify that the reading is between 27 mm and 28 mm Hg
- 6.2.5** Record the reading from both devices. The readings are recorded to the nearest 1/2 mm when using the mercury manometer.

7.0 TOLERANCE.

- 7.1** The reading of the vacuum gauge used for AASHTO T 331 shall be 10 mm Hg or less
- 7.2** The reading of the vacuum gauge used for ITM 572 shall be 6 mm Hg or less
- 7.3** A maximum of ± 2 mm Hg offset for the digital vacuum gage used in T 209 may be applied and is required to be clearly indicated at the test method point of use

**VACUUM CHAMBER VERIFICATION
ITM 905**

Vacuum Chamber (AASHTO T 331 / CoreLok)

EQUIPMENT:

Measurement Standard Identification: _____

Measurement Standard calibration date: _____

Device being verified: _____

VERIFICATION:

Reading on measurement standard _____ (less than 10 torr)

Remarks: _____

Verified by: _____ Date: _____

**VACUUM CHAMBER VERIFICATION
ITM 905**

Vacuum Chamber (ITM 572 / CoreDry)

EQUIPMENT:

Measurement Standard Identification: _____

Measurement Standard calibration date: _____

Device being verified: _____

VERIFICATION:

Reading on measurement standard _____ (less than 6 torr)

Remarks: _____

Verified by: _____ Date: _____

**VACUUM GAUGE VERIFICATION
ITM 905/AASHTO T209**

EQUIPMENT:

Digital Gauge Identification: _____

Mercury Manometer or Measurement Standard Identification: _____

Date of calibration if Measurement Standard gauge if used _____

VERIFICATION:

Vacuum reading of Measurement Standard: _____ (between 27-28, to the nearest ½ mm)

Vacuum reading of Digital Gauge: _____

Difference between Mercury Manometer/Measurement Standard and Digital Gauge being verified: _____ (not to exceed 2 mm)

If necessary, offset (+/-) clearly displayed where the digital gauge is used: _____
(Yes/NA)

Remarks: _____

Verified By: _____ Date: _____