| Manitoba Infrastructure<br>MATERIALS ENGINEERING BRANCH | Standard No.: **MEB-P034**<br>Effective Date<br>Current: **March 2020**<br>Previous: N/A<br>Page 1 of 3 |
|---|---|
| Standard Test Method For: **Density of Soils in Place by Nuclear Method** | |

## 1.0 SCOPE

This Standard Test method describes the procedures for measuring in-place density of soils by nuclear density gauge.

## 2.0 REFERENCE STANDARDS

*ASTM Standards*

D698 Laboratory Compaction Characteristics of Soil Using Standard Effort
D2216 Laboratory Determination of Moisture Content of Soil and Rock
D6938 Standard Test Method for in Place Density and Water Content of Soil and Soil-Aggregate by Nuclear Methods (Shallow Depth)

*MEB Standards*

P049 Nuclear Density Gauge Standard Count Calibration

*Acts and Regulations*

Transportation of Dangerous Goods Act
Transportation of Dangerous Good Regulations

## 3.0 GENERAL

3.1 Gauge Calibration and License

The nuclear density gauge shall be calibrated every 12 months against the certified density reference blocks by either the manufacturer of the gauge or qualified and trained personal.

The registered owner of the gauge shall maintain a valid *Nuclear Substances and Radiation Devices License* issued for portable gauges (Use Type 811) and ensure the *Transportation of Dangerous Goods Act and Regulations* are followed.

3.2 Weather Limitations

The nuclear density gauge shall not be operated when:

- the surface is frozen
- the surface is wet
- the temperature is below -5°C
- the weather conditions are unfavourable, or are likely to become unfavourable

## 4.0 PROCEDURE

Complete standard count as per *MEB P049 Nuclear Density Gauge Standard Count Calibration*.

*Follow ASTM D6938 In-Place Density and Water Content of Soil and Soil-Aggregate by Nuclear Methods (Shallow Depth), Procedure A – Direct Transmission.*

Depth for source rod shall be 50mm less than lift thickness.

Record two (2) one-minute density and moisture readings, rotating the gauge 180 degrees for the second reading.

Collect a soil sample of approximately 75 mm in diameter to the depth setting of the gauge between the rod hole and the center of the gauge:

- Sample size must be between 500 to 600 grams
- Double bag and seal to ensure moisture is not lost
- Label the bag to corresponding test location

Perform procedure correcting the gauge-derived moisture content value in accordance to the manufacturer's instructions.

Determine dry density in accordance to *ASTM D6938 In-Place Density and Water Content of Soil and Soil-Aggregate by Nuclear Methods (Shallow Depth).*

Determine maximum dry density in accordance to *ASTM D698 Standard Test Methods for Laboratory Compaction Characteristics of Soil Using Standard Effort.*

## 5.0 CALCULATION

Calculate the percent compaction of each test location as follows:

$$\% \textbf{ Compaction} = \frac{\textbf{Dry Density}}{\textbf{Maximum Dry Density}} * \textbf{ 100}$$

## 6.0 REPORT

Document values and calculations on forms provided by the Contract Administrator.