



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

**SPREADING, MIXING AND IDENTIFICATION
OF CHEMICAL MODIFIERS IN SOIL
STABILIZATION CONSTRUCTION
ITM No. 516-20**

1.0 SCOPE.

- 1.1** This ITM describes field tests for soil modification/stabilization during construction.
- 1.2** These tests are important for proper spreading, pulverization, and mixing of chemically treated soils.
- 1.3** This ITM may involve chemical handling during operations, 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 determining the applicability of regulatory limitations prior to use.

2.0 REFERENCES. "Design Procedures for Soil Modification or Stabilization": Division of Engineering and Asset Management, Geotechnical Engineering Division, 2013.

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

4.0 SIGNIFICANCE AND USE.

- 4.1** This ITM shall be used to verify the amount of the chemical modifiers dispensed in chemically modified soils in accordance with 215.
- 4.2** This method shall be used to determine whether chemically treated soils are sufficiently mixed and pulverized to the required gradation in accordance with 215.
- 4.3** This method shall be used to verify the presence of chemical modifiers in treated soil by applying phenolphthalein.

5.0 APPARATUS.

- 5.1** Mold: consisting of a square cardboard sheet/box or plywood.
- 5.2** 1 in. Sieve, No. 4 Sieve.
- 5.3** Balance. A Class G 20 meeting the accuracy requirements of M231.

5.4 Pan, Spoon.

6.0 MATERIAL.

6.1 Phenolphthalein.

7.0 PROCEDURE.

7.1 SPREADING OF CHEMICAL MODIFIERS.

7.1.1 An assessment of the material to be treated is required. When the chemical modifier is mixed with soils, scarification and disking is required.

7.1.2 The chemical modifier shall be spread uniformly.

7.1.3 To verify the amount of chemical modifiers dispensed in chemically modified soils, follow steps 7.1.4 through 7.1.8.

7.1.4 Determine the weight of the mold to the nearest 0.1 lbs.

7.1.5 Sample the chemical discharge using a board placed on the soil to be treated in front of the spreading truck.

7.1.6 Once the spreading truck has passed and covered the mold with the chemical modifier, determine the weight of both the mold and the chemical modifier to the nearest 0.1 lbs.

7.1.7 Determine the weight of the chemical by subtracting the weight of the mold from the weight of the chemical and mold .

7.1.8 Calculate the spreading rate by dividing the weight of the chemical by the area of the mold .

Note: Convert the area of the mold to square yards.

Example: Weight of mold sheet and chemical = X lbs.

Weight of mold = Y lbs.

Mold size A sq. ft.

$$((X \text{ lbs.} - Y \text{ lbs.})/A \text{ sq. ft.}) * (9 \text{ sq.ft/sq.yd})$$

8.0 REPORT. Spreading rate is reported in lb/yd²

9.0 PULVERIZATION AND MIXING REQUIREMENTS

Pulverization and mixing are specified in terms of the percentage passing the 1-inch sieve and passing the No. 4 Sieve.

- 9.1** When performing chemical modification of soils in accordance with 215, a major concern is to obtain uniform chemical modifiers throughout the depth of the treated soil.
- 9.2** To accomplish a complete modification/or stabilization, soils and chemical modifiers shall be mixed thoroughly.
- 9.3** Visual observation is made to ensure that uniform mixing has been accomplished throughout the full depth of treatment.
- 9.4** To determine whether chemically modified soils are sufficiently mixed and pulverized, follow steps 9.5 to 9.8.
- 9.5** Collect 5 lbs. of processed material.
- 9.6** Dry sieve the material using a 1 inch sieve, a No. 4 sieve, and a pan and determine the percent passing each sieve. Care must be taken to ensure that the material retained on the No. 4 sieve fraction is not actually agglomerated soil-chemical modifier mixture that can be easily broken down by a simple kneading action to pass the No. 4 Sieve.
- 9.7** The material shall be 100 percent passing the 1 inch sieve.
- 9.8** A minimum of 60 percent of the material shall pass the No. 4 Sieve.
- 9.9** If the material does not meet the requirements of 9.7 and 9.8, mixing and pulverization shall continue until those requirements are met.

10.0 REPORT. Soil chemical mixture meets gradation requirements. Yes__or No __.

11.0 CHEMICAL MODIFIER PRESENCE

- 11.1** Phenolphthalein is a color-sensitive indicator of pH.
- 11.2** The indicator can be successfully used to indicate the presence of chemical modifier.
- 11.3** The Phenolphthalein indicator solution has been used effectively to indicate depth of treatment.

- 11.4** This method does not provide the exact measurement of chemical modifiers; this will give an indication of the presence of chemical modifiers required for the soil treatment.
- 11.5** To verify the presence of chemical modifiers in treated soil, follow steps 11.6 to 11.9.
- 11.6** Excavate a small hole approximately the size of the excavator bucket, in order to expose the full depth of the modified layer.
- 11.7** Spray Phenolphthalein on the sides of the excavated hole.
- 11.8** If chemical modifiers are present, the soils will turn reddish-pink.
- 11.9** The presence of chemical modifiers shall be detected throughout the total depth of modification. If chemical modifiers are not detected throughout the total depth, the spreading and mixing process shall be adjusted to ensure full depth of modification.
- 12.0** **REPORT.** Indicator exhibits the presence of color throughout the total chemically modified depth Yes or No .