

ND D 4643 - MICROWAVE METHOD OF DRYING SOILS

Conduct this procedure according to ND D 4643.

Consult the current edition of ASTM for procedure in its entirety and equipment specification details.

SCOPE

This procedure is used to determine the total moisture content of a soil. The soil is dried to remove all free moisture. This test measures the weight of the moisture removed from the soil.

APPARATUS

Balance, readable to 0.1 g

Microwave safe dish

Glass rod, spatula or knife

Oven mitts

Heat sink

Microwave oven (It is preferable the microwave oven has a vented chamber, and a power rating of about 700 watts with variable power control.)

PROCEDURE

Record all weights to the nearest 0.1 g. Weigh a clean and dry microwave safe dish and record the weight as tare weight.

Determine the sample size needed from the table below. Place the sample in the container and immediately weigh. Record this weight as wet weight.

Sieve Retaining Not More Than About 10% of Sample	Recommended Mass of Moist Specimen
No. 10 (2.0 mm)	100 to 200 g
No. 4 (4.75 mm)	300 to 500 g
3/4" (19 mm)	500 to 1000 g

Place the container in the microwave oven with a heat sink, set power to defrost setting, set timer for 3 minutes and start (See Notes). The 3-minute initial time is a minimum.

When the microwave oven stops, remove from the oven and weigh to the nearest 0.1 g and note. Use a small spatula, glass rod, or knife and carefully mix the soil. Take care not to lose any soil.

Return the container and soil to the oven and reheat for 1 minute. Remove, weigh, and again mix with spatula, glass rod, or knife. Repeat this process until a constant weight has been achieved. Use the final weight to calculate the moisture content. Record this weight as dry weight.

Discard sample after test.

CALCULATIONS

Calculate the percent moisture as follows:

$$A = [(B - C)/(C - D)] \times 100$$

A = Percent moisture

B = Mass of original (wet) sample, and container

C = Mass of dry sample, and container

D = Mass of container

REPORT

Report moisture to the nearest 0.1%.

NOTES

Initial power setting may be higher than defrost. The proper power setting can be determined only through the use of, and experience with a particular microwave.

Soils that are high in moisture and contain a large portion of clay take a longer time to dry. Initial heating time for this type of soil may be 12 minutes. Care should be taken to reduce cohesive samples to 1/4" particles to speed drying and prevent crusting or overheating of the surface while drying the interior.

Constant weight is defined as when further drying will cause less than 0.1% additional loss in mass when weighed at specified intervals. Specified weighing interval for microwave drying is one minute.

CALIBRATION

A calibration check of the equipment should be performed annually as a minimum, or whenever damage or repair occurs.