NOTE: This Document is "Inactive"

(INACTIVE)
OHD L-31
METHOD OF TEST FOR
PREPARATION OF SHALES FOR ANALYSIS
GRAIN SIZE DISTRIBUTION

I. **SCOPE.** The procedure described below is applicable to clay forming materials such as hardened clay soils, hard pan, shales, etc. It presents a method of preparing a sample of the material so that the grain size distribution can be determined under the most critical conditions.

II. **APPARATUS.**

A. **Westinghouse Ultrasonic Cleaning System** is comprised of the following:

1. Solid State Magnatrak™ 200 watt generator.

2. 1.5 gallons (5.7L) capacity stainless steel tank with Magnapak™ transducers.

B. **Stainless Steel Beakers,** two (2) 1,000 milliliters (4 inches diameter, 6 inches high).

C. **Stirrers,** two (2).

D. **Reciprocating Pump,** ½ gallon (1.9L) per minute.

E. **Conical Flask, 1 Qt. (**1,000 milliliters).

F. **Plexiglas Plate,** 12 x 8 x ¾ inches (30.5 x 20.3 x 1.9 cm).

G. **Rubber Tubing.**

H. **Beakers,** 1 pint (500 milliliters).

NOTE: Items C through G are optional but they are recommended specifically for temperature control and greater efficiency.

III. **SAMPLE.** Test sample shall be obtained from the bulk sample by quartering or by using a riffle sampler. Moisture samples may be taken if needed.

IV. **PROCEDURE.** The steps indicated below pertain to the sample preparation method for grain size distribution determination including hydrometer analysis (AASHTO T 88-57, ASTM D 422-63).

A. Spread the material obtained in the field in a thin layer and air dry it.

B. Using a rubber end pestle and mortar, crush the material to pass the U.S. Standard Sieve Number 10.

C. Determine the moisture content of air dried material.

D. Weigh accurately 50-80 grams of air dried material.

E. Transfer weighed material into a 8 fl.oz.(250 milliliter) beaker.

F. Add 4 fl.oz (125 milliliters) of sodium hexametaphosphate solution or whatever amount and type of deflocculating agent is conventionally used in your laboratory for hydrometer analysis.

The sample is now ready for ultrasonic treatment.

G. Transfer the presoaked material into the 4 inches diameter, 6 inches high (1,000 milliliter) stainless steel beaker, making sure that all particles are transferred. Use as little additional distilled water as possible.

H. Place beaker(s) in the ultrasonic tank and place plexiglas plate on it. Use adhesive tape to hold the plate firmly down to the tank and to the beaker(s).

I. Lower the stirrer along the center of the beaker until fins are about one inch (2.5cm) above the bottom of the beaker.

J. Connect the stirrer to motor control and motor control to AC source.

K. Switch the motor on and run the stirrer at high speed. All the material should now go into suspension; if it does not, switch off the motor and lower the stirrer further in the beaker. After a few trials, the desired position of the stirrer can be determined in this way. Fix the stirrer in that position.

L. Run the stirrer at a medium speed which will prevent settling of suspended particles.

M. Turn on the water source and pump. Adjust the flow of water until the inflow is slightly greater than the outflow. Any excess water will be drained off through the overflow outlet of the conical flask.

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O. Connect the ultrasonic generator to the proper AC source and switch on the generator. Record the time as the generator is switched on since it marks the start of ultrasonic treatment.

P. At the end of one hour ultrasonic treatment time, turn off the generator and water. When no more water is reaching the pump, turn it off also.

Q. Remove the stirrer, adhesive tape, plexiglas plate and the beaker, in that order, from the tank. The material in the beaker is the required ultrasonically treated material.

R. Transfer the material from the stainless steel beaker to a 1 Qt. (1,000 milliliter)

hydrometer jar for the standard hydrometer analysis as specified by AASHTO T 88-57, ASTM D 422-63.