

State of Nevada
Department of Highways
Materials and Testing Division

METHOD OF TEST FOR APPARENT SPECIFIC GRAVITY OF POROUS
AGGREGATES

SCOPE

This test method is intended for use in determining the apparent specific gravity of aggregate particles retained on the No. 4 (4.75 mm) and larger sieve sizes. This test is to be applied to materials whose bulk gravity is less than one and are very porous with particles that disintegrate to some extent in water.

A. APPARATUS

1. Pycnometer. A one quart (.9463 litres) glass jar fitted with a conical lid having a small opening at the apex of the cone.
2. Balance. A balance sensitive to one gram and having a capacity of at least 2,000 grams.
3. A long wire tweezer.
4. All equipment and materials shall be at room temperature when performing the test.
5. Sand: Clean, dry, free-flowing sand having uniform grading. Standard Ottawa sand, or other free-flowing sand, passing the No. 20 (841 microns) and retained on the No. 50 (.0300 mm) sieve is most suitable.

B. CALIBRATION OF THE PYCNOMETER (USING WATER)

The pycnometer shall first be cleaned and weighed, and the weight (P) recorded to the nearest gram. The pycnometer shall then be filled with room temperature water. The outside of the pycnometer shall be dried, and air bubbles clinging to the inside shall be dislodged by gently tapping on the outside of the jar. The water level shall then be brought back up to the opening, and the outside of the pycnometer dried again, if necessary. The weight of the pycnometer filled with water (P_w) is then determined to the nearest gram and recorded.

C. CALIBRATION OF THE PYCNOMETER (USING SAND)

Sand shall be added to the pycnometer using the conical lid as a funnel for pouring control. The height of the fall at which the sand is placed in the pycnometer should at all times remain constant, at a point above the pycnometer approximately one inch (2.54 cm) from the mouth. Fill the glass pycnometer jar with sand in the manner described above. Carefully place the conical screw top snugly with a minimum of disturbance to the contained sand. Finish filling the pycnometer by pouring sand through the hole at the apex of the conical lid.

Level off the sand at the pycnometer top, wipe off sand clinging to the outside and weigh. This procedure must be performed with little or no vibration or disturbance that would cause the loose sand to densify. The weight of the pycnometer filled with sand (P_s) shall be determined to the nearest gram and recorded.

D. SAMPLE PREPARATION

The aggregate to be tested shall be dried to constant weight at a temperature not to exceed 230° F. (110° C.). The size of the sample to be tested will vary from 200 to 500 grams depending on the volume that the material occupies in the pycnometer. The weight of the aggregate (A) shall be determined to the nearest gram and recorded.

E. TEST PROCEDURE

Pour approximately one inch (2.54 cm) of sand in the pycnometer as specified in Part C; then place a layer of the +No. 4 (4.75 mm) aggregate in the pycnometer by using a long wire tweezer with a minimum disturbance to the layer of sand. Avoid placing the aggregate particles on top of one another so that sand will surround all particles. Repeat the above operation with each layer until all particles of the sample are contained in the pycnometer. The entire sample should be contained in the glass jar portion of the pycnometer and the conical top shall then be placed and filled with sand with a minimum amount of disturbance. Weigh the pycnometer and contents and record the weight (P_b) to the nearest gram.

F. CALCULATIONS

Calculate the specific gravity as follows:

$$1. \quad K = \frac{P_s - P}{P_w - P}$$

$$2. \quad P_s + A - P_b = S$$

$$3. \quad V = S \quad K$$

$$4. \quad \text{Apparent Specific Gravity} = \frac{A}{V}$$

Where:

A = Weight of dried aggregate

P = Weight of pycnometer

P_s = Weight of pycnometer filled with sand

P_w = Weight of pycnometer filled with water

P_b = Weight of aggregate, pycnometer and sand

S = Weight of sand displaced

V = Volume of aggregate

K = Density of sand (in grams/cu. cm.)

All weights are in grams