

Colorado Procedure 33-12

Standard Method of Test for

Total Evaporable Moisture Content and Surface Moisture Content of Aggregates by Drying

1. SCOPE

- 1.1 This procedure covers the determination of the percentage of evaporable moisture in a sample of aggregate by drying both surface moisture and the moisture in the aggregate. To be used in the field to determine the percentage of surface moisture content in aggregates.

2. APPARATUS

- 2.1 Balance - Sufficient capacity and sensitivity to 0.1 g.
- 2.2 Drying equipment - Hot plate, ventilated oven, or a ventilated microwave oven.
- 2.3 Drying pan and necessary hand tools.

3. PROCEDURE

- 3.1 The minimum test sample mass shall be that in Table 33-1.

Table 33-1

Aggregate Nominal Maximum Size Square Opening, inches	Minimum Weight (Mass) of Test Sample, Pounds (kg)
< 3/8	0.66 (0.30)
3/8	2.2 (1.0)
1/2	3.3 (1.5)
3/4	4.4 (2.0)
1	5.5 (2.5)
1-1/2	11.0 (5.0)
2	16.0 (7.5)
2-1/2	22.0 (10.0)
3	27.5 (12.5)
3-1/2	33.0 (15.0)

Note 1: Nominal maximum size is as defined in the Appendix of the Field Materials Manual.

- 3.2 Immediately after obtaining the specimen, weigh to the nearest 0.1 g and record as wet weight (mass). Dry to a constant weight (mass). Constant weight (mass) is achieved when further heating causes, or would cause, less than 0.1 percent additional loss in mass. If using a ventilated oven, set it at $230^{\circ}\text{F} \pm 9^{\circ}$ ($110^{\circ}\text{C} \pm 5^{\circ}$). When dry, weigh to the nearest 0.1 g and report as dry weight (mass).

4. CALCULATIONS

4.1 Determine the total percentage of moisture on an oven-dry basis as follows:

$$\% \text{ moisture, (oven dry basis)} = \frac{\text{Wet wt} - \text{Dry wt}}{\text{Dry wt}} \times 100$$

4.2 Calculate the percent surface (free) moisture as follows:

$$\% \text{ surface moisture} = \left(\begin{array}{c} \% \text{ moisture} \\ \text{(oven dry basis)} \end{array} \right) - \left(\begin{array}{c} \% \text{ absorption} \\ \text{(from mix design)} \end{array} \right)$$

Note 2: The calculations in Subsection 4.2, for percent surface moisture, do not give the same result as calculating percent surface moisture on a saturated surface dry method as called for by design procedures. However, for the degree of accuracy required, the simpler method is acceptable for field control of aggregate batch weights (masses).

The following examples will illustrate the comparison between the two methods of calculation.

EXAMPLE:

Wet weight	=	100.0 g
(Oven) Dry wt.	=	95.0 g
Loss	=	5.0 g
% Absorption from Mix Design	=	2.0

% Surface Moisture, Oven Dry Method

$$\begin{aligned} &= \left(\frac{100 - 96.9}{96.0} \times 100 \right) - 2.0\% \\ &= 5.26 - 2.0 \\ &= 3.26\% \end{aligned}$$

% Surface Moisture, Saturated Surface Dry Method (SSD)

$$\% \text{ moisture, (SSD)} = \frac{\text{Wet wt} - \text{SSD wt}}{\text{SSD wt}} \times 100$$

$$\text{SSD wt.} = \frac{\text{Oven Dry wt} \times (100 + \text{absorption})}{100}$$

$$\text{SSD wt.} = \frac{95.0 \times 102}{100} = 96.9$$

$$\% \text{ surface moisture, (SSD)} = \frac{100 - 96.9}{96.0} \times 100 = 3.20\%$$

The difference between the two methods is:

$$\begin{array}{r} 3.26 \\ -3.20 \\ \hline 0.06 \% \end{array}$$

5. REPORT

5.1 Report % SSD on Form 6 in the "Remarks" field.

{Page Intentionally Left Blank}