ATT-14/22, MOISTURE CONTENT, Open Pan Method

1.0 SCOPE

This method covers the procedures for determining the moisture content of granular materials, or cement stabilized base course mix, using a field laboratory propane stove or electric hot plate.

2.0 EQUIPMENT

lab propane stove (or electric hot plate)
electronic balance (sensitive to 0.1 gram)
putty knife
heat resistant gloves
drying pan
plastic pail or plastic bag
thermometer
Stirrer (spoon or spatula)

Data Sheet: Moisture Content, such as MAT 6-24

3.0 PROCEDURE

1. Obtain a representative aggregate sample, or cement stabilized base course mix sample, as per ATT-38, and protect it against loss of moisture prior to determining the weight. An air-tight plastic pail, or plastic bag, is best for this purpose. The moisture content sample should be approximately 3,000 grams.

2. Complete the “Heading” and “Sample Identification” portions of the data sheet. An example is illustrated in Figure 1.

3. Label a drying pan and record the “Container Number”.

4. Weigh the drying pan and record as “Tare of Container” on line "C", to the nearest 0.1 gram.

5. Empty the contents of the sample pail into the drying pan and weigh. Record the weight as “Wt. of Wet Sample + Tare on line "A", to the nearest 0.1 gram.

6. Light both burners of the stove, using low to medium heat, and centre the drying pan on the burners.

7. Allow the aggregate to gradually heat up until steam is noticed, and then you may want to turn up the heat slightly, in order to dry the sample faster.

8. Use a putty knife to stir the aggregate frequently, mixing the wet material along the edges of the pan with the dry material over the burners. When heating fine aggregate, it may tend to stick to the stirrer while it’s wet or damp. Carefully tap the stirrer on the side of the sample container to remove any stuck-on aggregate and ensure that it all goes back into the rest of the sample for drying. Do not allow the aggregate temperature to exceed 150^{o}C.

   NOTE: If the aggregate is extremely wet, the water may begin to boil, splattering fines out of the pan. This can be prevented by constant stirring, or if necessary, by gradually heating up the sample on a low setting for a longer time before turning up the heat. Placing another tare pan upside down, slightly staggered, on top of the tare pan containing the sample, can also help to keep from losing any aggregate that jumps out of the pan while heating.

9. Continue drying until the sample reaches a constant dry weight. This is verified by alternately drying and weighing, until two consecutive weights remain the same. When dry, no moisture should be noticed on the bottom of the tare pan, when you gently shake the tare pan back and forth, and move the sample across the tare pan.

10. ***Remove the dried sample from the stove, and allow it to cool just enough so that the pan can be handled without gloves***, then weigh and record as "Wt. of Dry Sample + Tare" on line "B", to the nearest 0.1 gram.

11. Calculate the "Weight of Water" removed on line "D" as follows:

Wt. of Water (g) = (Wt. of Wet Sample + Tare) - (Wt. of Dry Sample + Tare)

12. Determine the "Weight of Dry Sample" on line "E" as follows:

Wt. of Dry Sample (g) = (Wt. of Dry Sample + Tare) - (Tare of Container)

13. Calculate the "Moisture Content" of the sample, to the nearest 0.1%, on line "E" using the formula:

$$\textit{Moisture Content (\%)} = \frac{\textit{Wt. of Water}}{\textit{Wt. of Dry Sample}} \times 100\%$$

Alberta Transportation

MAT 6-24/13

MOISTURE CONTENT

PROJECT :	Hwy 36:04	Contractor :	ABC Const.
CONTRACT NO. :	123456	DATE :	18-Aug-2021
ATT-14 MOISTURE CONTENT, Open Pan Method		TECH :	J. Jones

SAMPLE IDENTIFICATION						
DATE	18-Aug-2021		18-Aug-2021			
LOT NUMBER	12		12			
TEST NUMBER	3		5			
SAMPLE SOURCE	Stockpile		Truck No. 16			
STATION			cement stab.			
LOCATION			base course			
DEPTH BELOW GRADE OR LIFT			prod. rate			

MOISTURE CONTENT								
	CONTAINER NUMBER		g	X		Y		
A.	WEIGHT OF WET SAMPLE + TARE		g	4541.5		4347.0		
B.	WEIGHT OF DRY SAMPLE + TARE		g	4377.0		4046.5		
C.	TARE OF CONTAINER		g	1309.2		1206.3		
D.	WEIGHT OF WATER	A - B	g	164.5		300.5		
E.	WEIGHT OF DRY SAMPLE	B - C	g	3067.8		2840.2		
F.	MOISTURE CONTENT	(D/E) x 100	%	**5.4**		**10.6**		

REMARKS:

FIGURE 1

4.0 HINTS AND PRECAUTIONS

1. ***This method cannot be used for determining the moisture content of asphalt mixes or aggregates containing coal or organic material.*** These materials will burn off during the test giving incorrect results. Use test ATT-15, MOISTURE CONTENT, Oven Method for these materials.

2. **Do not overheat the sample**, noticeable by some of the aggregate turning a brown, burnt looking colour.

3. The propane stove is an excellent choice for quickly determining the moisture content. However, care should be taken to **avoid excessive localized overheating and fracturing of aggregates.** If fracturing of the aggregate occurs, another moisture content sample is required. Whenever a propane stove is used to heat the sample, it needs to be constantly stirred while observing the state of the aggregate. Some types of aggregate will not tolerate the high localized heat and may fracture despite the best of care. In this case, the lab oven method should be used (ATT-15) instead.

4. Use container holders, or heat-resistant gloves, while handling hot containers.

5. Wear eye protection while stirring and weighing the heated material due to possible shattering of aggregate particles.

6. Ensure the Balance Heat Shield is on the balance platform before weighing any samples, to protect the load cell.

7. Carefully watch the sample during the heating and drying process and never leave a heating sample unattended.

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