ATT-6/95 DENSITY, Immersion Method Waxed Asphalt Concrete Specimens

1.0 SCOPE

This method describes the procedure for waxing and determining the dry density of asphalt concrete cores and field formed Marshall specimens.

2..0 EQUIPMENT

wax
double dish wax pot
potable water
equipment for ATT-7, DENSITY, Immersion Method, Saturated Surface Dry Asphalt Concrete Specimens

Data Sheet: ACP Density, Wax Coating Method (MAT 6-41).

3.0 PROCEDURE

3.1 General

When performing ATT-7, Sample Preparation, Section 3.2 and the specimen is soaking to achieve the saturated surface dry condition, the technologist should observe if air bubbles come from the interior of the specimen. If it is suspected that water is entering the specimen, both the unwaxed and waxed coating method should be used to determine volume. A difference in volumes of over 1% will require the use of the wax coating method.

3.2 Equipment Preparation

1. Repeat ATT-7, Section 3.1, Equipment Preparation.

3.3 Sample Preparation

1. Repeat ATT-7, Section 3.2, steps 1 to 4.

2. Record the visual inspection results in the "Sample Appearance" section of the data sheet, as shown in Figure 1. Record the Sawed Core Weight or the Weight of Marshall After Forming in line "A".

3. Melt two or three blocks of wax in the double dish wax pots as follows:

    a) Place the larger pan on the propane stove and fill it about one third full of water.

    b) Place the smaller pot in the water and place the wax in this pot.

c) Light the burner and allow the water to come to a gentle boil.

d) Hold the water at a gentle boil until the wax melts and all of the samples are coated.

4. Coat the sample by gently immersing it in the wax until the specimen is completely covered using a minimum wax coating thickness. Wax can be poured from a spoon to fill in small pore holes.

NOTE: Gloves should be worn while coating each sample to prevent burns from the hot wax.

5. Once the sample is completely coated, set it in a clean pan and allow the wax to cool for 15 minutes.

Alberta Transportation and Utilities

ACP DENSITY TEST - WAX COATING METHOD

PROJECT NO. 99:08 CONTRACT NO. 6666/95 PIT NAME Hart River

DATE			95.08.22			95.08.20	95.08.20		
LOT NUMBER			1			1	1		
TEST NUMBER OR SEGMENT NUMBER			1			1 A	1 B		
STATION			4+267						
LOCATION			2.3 m Rt.						
LIFT			1						
CORE THICKNESS mm			43						
SAMPLE APPEARANCE	ASPHALT CONTENT	BLEEDING							
		RICH							
		NORMAL	√			√	√		
		LEAN							
	GRADATION	EXCESS COARSE							
		NORMAL	√			√	√		
		EXCESS FINES							
	VOIDS CONTENT	HIGH							
		NORMAL	√			√	√		
		LOW							
A	SAWED CORE WEIGHT	g	1797.8						
	WT. AFTER FORMING MARSHALL SPECIMEN	g				1200.3	1199.8		
B	WEIGHT OF WET SAMPLE + WAX	g	1812.5			1211.5	1211.6		
C	WEIGHT OF SUSPENDED SAMPLE + WAX + WATER	g	9879.8			9610.6	9608.2		
D	WEIGHT OF WATER BEFORE TEST	g	9084.3			9081.9	9078.6		
E	VOLUME OF SAMPLE + WAX C - D	g	795.5			528.7	529.6		
F	WEIGHT OF WAX B - A	g	14.7			11.2	11.8		
G	VOLUME OF WAX F / 0.914	cm^3	16.1			12.3	12.9		
H	VOLUME OF SAMPLE E - G	cm^3	779.4			516.4	516.7		
I	WET DENSITY 100 A / H	kg/cm^3	2306.6			2324.4	2322.0		
J	WEIGHT OF OVEN DRY SAMPLE + WAX + PAN	g	2627.4			1335.0	1339.5		
K	WEIGHT OF TARE PAN	g	830.9			125.8	130.4		
L	WEIGHT OF OVEN DRY SAMPLE + WAX J - K	g	1796.5			1209.2	1209.1		
M	WEIGHT OF OVEN DRY SAMPLE L - F	g	1781.8			1198.0	1197.3		
N	WEIGHT OF WATER A - M	g	16.0			2.3	2.5		
O	MOISTURE CONTENT 100 N / M	%	0.90			0.19	0.21		
P	DRY DENSITY 100 M / H	kg/m^3	2286.1			2319.9	2317.2		

MAT 6-41/95

REMARKS _____ MATERIALS TECHNOLOGISTS J. Smith

FIGURE 1

6. Brush off loose wax then weigh the coated specimen. Record as Wt. of Sample + Wax (line "B").

3.4 Immersion Volume

1. Weigh the plastic pail and the water and record as Wt. of Water Before Test (line "D"). The pail should be 3/4 full of potable water.

2. Suspend the sample by the snare wire and completely immerse it in the water. The sample must not touch the sides or the bottom of the pail, and be covered by at least 25 mm of water. The snare wire must be carefully positioned to avoid penetrating the wax seal.

3. Weigh the immersed sample and record at Wt. of Suspended Sample + Wax + Water (line "C").

4. Calculate the volume of the waxed specimen in cm^3 (line "E") as follows:

Vol. (cm^3) = (Wt. of Pail + Water + Immersed Specimen) - (Wt. of Pail + Water)

5. Calculate the Wt. of Wax (line "F") as follows:

Wt. of Wax (g) = Wt. of Waxed Sample - Wt. After Coring or Forming

6. Calculate the volume of wax (line "G"), knowing the relative density of the wax (0.914) as follows:

$$\textbf{Volume of Wax } (cm^3) = \frac{Wt.\ of\ Wax}{0.914}$$

7. Determine the volume of the specimen (line "H") using the formula:

Volume of Sample (cm^3) = Volume of Waxed Sample - Volume of Wax

3.5 Dry Density

1. After the immersion volume is determined, remove the sample from the plastic pail and towel dry the excess moisture.

2. Label and tare a drying pan. Record the weight and number of pan in line "K".

3. Place the specimen in the drying pan and oven dry it at 130°C ± 5°C to a constant weight.

4. Break up the specimen after it has been in the oven for about a half hour, taking care not to lose any material.

5. Calculate the Wet Density of the specimen in kg/m^3 (line "I") using the formula:

$$Wet\ Density\ (kg/m^3) = \frac{Wt.\ After\ Coring\ or\ Forming\ (g)}{Volume\ of\ Sample\ (cm^3)} \times 1000$$

6. When the sample reaches a constant dry weight, remove the sample from the oven.

7. Weigh the hot sample and record as Wt. of Oven Dry Sample + Wax + Pan (line "J").

8. Calculate the oven dry weight of the specimen (line "M") as follows:

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

9. Determine the weight of water removed from the specimen (line "N") using the formula:

Wt. of Water (g) = Wt. After Coring or Forming - Wt. of Oven Dry Specimen

10. Calculate the Moisture Content in % (line "0") of the specimen as follows:

$$Mosture\ Content\ (\%) = \frac{Wt.\ of\ Water}{Wt.\ of\ Dry\ Specimen} \times 100\%$$

11. Determine the Dry Density in kg/m^3 (line"P") of the core using the formula:

$$Dry\ Density\ (kg/m^3) = \frac{Wt.\ of\ Dry\ Specimen}{Volume\ of\ Specimen} \times 1000$$

4.0 HINTS AND PRECAUTIONS

1. The tare weight of the plastic pail and the water must be checked prior to immersing each new sample, as water adhering to the previous sample will cause a continual decrease in this tare weight.

2. For protection, gloves should be worn when waxing the samples.