Method for Field Determination of the Daily Asphalt Binder Content

1. Scope:

This test covers the procedure for calculating the daily asphalt binder content for an asphalt hot mix plant.

2. Apparatus:

2.1 Furnished charts showing the capacity per fractions of an inch for each oil storage tank.

2.2 A measuring device to measure the amount of asphalt in the storage tank. A calibrated stick or tape measure.

NOTE: The asphalt storage tanks must be level and remain level for measurements to be reliable.

3. Procedure:

3.1 Measure the depth and take the temperature of the asphalt binder in the storage tank or tanks before the plant starts to produce hot mix.

3.2 Determine the number of gallons of asphalt binder at the storage temperature from the charts furnished for the storage tank capacity. Convert this gallon quantity to a weight quantity in pounds by using one of the formulas on the back of form DOT-89. (Figure 1) These formulas are used to determine the weight per gallon of asphalt binder at a particular temperature by using a multiplier for correcting oil volumes to the basis of 60° F. Multiply the weight per gallon of asphalt binder at the storage temperature by the number of gallons and divide by 2,000 lbs. to get the tons of asphalt binder in the storage tank.

The weight per gallon of asphalt binder at 60° F and/or the specific gravity of the asphalt binder can be found on the Certificate of Compliance or weight ticket furnished with each load of asphalt binder delivered to the project.

3.3 Add up the weight in tons of the truckloads of asphalt binder added to the storage tanks during the day.

3.4 Measure the depth and take the temperature of the asphalt binder in the storage tank or tanks after the plant finishes producing hot mix.

3.5 Convert the gallons of asphalt binder to tons by using the same procedure as used in 3.2 above.

3.6 Record the weight of all hot mix produced by the plant in tons.

4. Report:

4.1 Calculate the daily asphalt binder content in the following manner to the nearest 0.01% on a DOT-89.

$$\text{Daily asphalt binder content} = \frac{(A + B - C) \times 100}{D}$$

A = Tons of asphalt binder in the storage tanks at the start of the day.

B = Tons of asphalt binder added to storage tanks during the day.

C = Tons of asphalt binder in the storage tanks at the end of the day.

D = Tons of hot mix produced during the day.

4.2 Report the daily asphalt binder content to one decimal place.

5. References:

DOT-66
DOT-89

Sample ID 2223389

Bitumen Content Determination

DOT-89
3-19

Report No. 14

County Aurora, Ziebach

PCN/PROJECT B015 PH 0066(00)15

Test Date 05/03/2019 Inspector Tester, One Contractor Roads, Inc

Percent Bitumen Desired

Percent Used By Test 5.9

Bitumen Type 320E0008 - PG 64-34 Asphalt Binder

TANK METHOD	Tank #1	Tank #2
A. Beginning Specific Gravity of Bitumen @ 60 F	1.033	1.03
B. Beginning Weight Per Gallon @ 60 F	8.6034	8.6034
C. Temperature of Bitumen in Tank When Check Starts	305	298
D. Weight Per Gallon of Bitumen at Temperature (*)	7.890	7.910
E. Gallons in Tank When Check Starts (calibrated stick)	18,495	18,465
Gallons at Start (at start of tank use)	☐	☐
F. Weight of Bitumen in Tank (start check) (D x E / 2000)	72.96	73.03
G. Weight of Bitumen Added to Tank(s)	282.20	
H. Temperature of Bitumen in Tank When Check Ends	301	298
I. Gallons in Tank When Check Ends (calibrated stick)	17,745	18,465
J. Ending Specific Gravity of Bitumen @ 60 F	1.033	1.033
K. Ending Weight Per Gallon @ 60 F	8.6034	8.6034
L. Weight Per Gallon at Temperature (*)	7.901	7.910
M. Weight of Bitumen in Tank (end check) (I x L / 2000)	70.10	73.03
Left in Storage (at end of tank use)	☐	☐
N. Weight of Bitumen Used (F + G - M)	285.06	
O. Weight of Mix Produced (Tons)	4,833.21	
P. Percent Bitumen in Mix (N / O x 100)	5.90	

G. Load #	Invoice #	Tons
032	184619	40.22
033	184620	40.49
034	184621	40.47
035	184622	40.21
036	184623	40.26
037	184623	40.26
038	184624	40.29

Summary of Mix Produced			Bitumen	
To Road	4,827.21	Tons	284.71	Tons
Plant Waste	5.00	Tons	0.29	Tons
Road Waste	1.00	Tons	0.06	Tons
To Others		Tons		Tons
Produced	4,833.21	Tons		

REMARKS

Comments

Figure 1

DETERMINING POUNDS OF BITUMEN PER GALLON (Figure 1 cont.)
[Tank #1 Example]

1. **1.033** (Spec. Gravity of Bitumen) **X** **0.9171** (Temp. Factor) **X 8.328 (1) =** **7.890** (Lbs. of Bitumen per Gallon @ Temp.)

2. **8.6034** (Wt. per Gallon @ 60°F) **X** **0.9171** (Temp. Factor) **=** **7.890** (Lbs. of Bitumen per Gallon @ Temp.)

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Temp. ºF	Factor
225	0.9436
230	0.9419
235	0.9402
240	0.9385
245	0.9369
250	0.9352
255	0.9336
260	0.9319
265	0.9302
270	0.9286
275	0.9269
280	0.9253
285	0.9236
290	0.9220
295	0.9204
300	0.9187
305	0.9171
310	0.9154
315	0.9138
320	0.9122
325	0.9105
330	0.9089
335	0.9073
340	0.9057
345	0.9040
350	0.9024

(Table for converting pounds of bitumen per gallon – Applicable for DOT-89 & DOT-66)

Sample ID 2225780 **Asphalt Plant Mix - Spot Check** **DOT-66**

File No. 7-19

PROJECT PH 0066(00)15 COUNTY Aurora, Ziebach PCN B015

Field # 01 Date Sampled 07/03/2019 Date Tested 07/03/2019

Inspector Tester, One Contractor Roads, Inc

TANK METHOD	**Tank #1**	**Tank #2**
A. Beginning Specific Gravity of Bitumen @ 60 F	1.320	1.032
B. Beginning Weight Per Gallon @ 60 F	8.5945	8.5945
C. Temperature of Bitumen in Tank When Check Starts	300	300
D. Weight Per Gallon of Bitumen at Temperature (*)	7.896	7.896
E. Gallons in Tank When Check Starts (calibrated stick)	3,685	6,304
Gallons at Start (at start of tank use)	☐	☐
F. Weight of Bitumen in Tank (start check) (D x E / 2000)	14.55	24.89
G. Weight of Bitumen Added to Tank(s)	184.92	
H. Temperature of Bitumen in Tank When Check Ends	300	300
I. Gallons in Tank When Check Ends (calibrated stick)	3,332	5,771
J. Ending Specific Gravity of Bitumen @ 60 F	1.320	1.032
K. Ending Weight Per Gallon @ 60 F	8.5945	8.5945
L. Weight Per Gallon at Temperature (*)	7.896	7.896
M. Weight of Bitumen in Tank (end check) (I x L / 2000)	13.15	22.78
Left in Storage (at end of tank use)	☐	☐
N. Weight of Bitumen Used (F + G - M)	188.43	
O. Weight of Mix Produced (Tons)	3,101.80	
P. Percent Bitumen in Mix (N / O x 100)	6.07	

METER METHOD

Q. Applied Temperature of Bitumen	300
R. Weight Per Gallon (D) of Bitumen at Applied Temperature	7.896
S. Weight of Mix Produced (tons)	3,101.80

Meter Reads in Weight

T. Stop (tons) _____

U. Start (tons) _____

V. Net Weight _____

V / S x 100 = _____ % bitumen in mix

Meter Reads in Gallons

T. Stop (gallons) _____

U. Start (gallons) _____

V. Net Weight _____

R x (V / S)/2000 x 100 = _____ % bitumen in mix

Comments _____

Figure 2

Sample ID 2225789 **Asphalt Plant Mix - Spot Check** **DOT-66**
File No. 7-19

PROJECT PH 0066(00)15 COUNTY Aurora, Ziebach PCN B015
Field # 02 Date Sampled 07/03/2019 Date Tested 07/03/2019
Inspector Tester, One Contractor Roads, Inc

TANK METHOD	**Tank #1**
A. Beginning Specific Gravity of Bitumen @ 60 F	
B. Beginning Weight Per Gallon @ 60 F	
C. Temperature of Bitumen in Tank When Check Starts	300
D. Weight Per Gallon of Bitumen at Temperature (*)	
E. Gallons in Tank When Check Starts (calibrated stick)	
Gallons at Start (at start of tank use)	☐
F. Weight of Bitumen in Tank (start check) (D x E / 2000)	
G. Weight of Bitumen Added to Tank(s)	0.00
H. Temperature of Bitumen in Tank When Check Ends	
I. Gallons in Tank When Check Ends (calibrated stick)	
J. Ending Specific Gravity of Bitumen @ 60 F	
K. Ending Weight Per Gallon @ 60 F	
L. Weight Per Gallon at Temperature (*)	
M. Weight of Bitumen in Tank (end check) (I x L / 2000)	
Left in Storage (at end of tank use)	☐
N. Weight of Bitumen Used (F + G - M)	
O. Weight of Mix Produced (Tons)	1,256.00
P. Percent Bitumen in Mix (N / O x 100)	

METER METHOD

Q. Applied Temperature of Bitumen	300
R. Weight Per Gallon (D) of Bitumen at Applied Temperature	
S. Weight of Mix Produced (tons)	1,256.00

Meter Reads in Weight		Meter Reads in Gallons	
T. Stop (tons)	73.0	T. Stop (gallons)	
U. Start (tons)	0.0	U. Start (gallons)	
V. Net Weight	73.0	V. Net Weight	
V / S x 100 =	5.81 % bitumen in mix	R x (V / S)/2000 x 100 =	% bitumen in mix

Comments

Figure 3

Sample ID 2225791

File No.

Asphalt Plant Mix - Spot Check

DOT-66
7-19

PROJECT PH 0066(00)15 COUNTY Aurora, Ziebach PCN B015

Field # 03 Date Sampled 07/03/2019 Date Tested 07/03/2019

Inspector Tester, One Contractor Roads, Inc

TANK METHOD	Tank #1
A. Beginning Specific Gravity of Bitumen @ 60 F	1.032
B. Beginning Weight Per Gallon @ 60 F	8.5945
C. Temperature of Bitumen in Tank When Check Starts	310
D. Weight Per Gallon of Bitumen at Temperature (*)	7.867
E. Gallons in Tank When Check Starts (calibrated stick)	
Gallons at Start (at start of tank use)	☐
F. Weight of Bitumen in Tank (start check) (D x E / 2000)	
G. Weight of Bitumen Added to Tank(s)	0.00
H. Temperature of Bitumen in Tank When Check Ends	
I. Gallons in Tank When Check Ends (calibrated stick)	
J. Ending Specific Gravity of Bitumen @ 60 F	1.032
K. Ending Weight Per Gallon @ 60 F	8.5945
L. Weight Per Gallon at Temperature (*)	
M. Weight of Bitumen in Tank (end check) (I x L / 2000)	
Left in Storage (at end of tank use)	☐
N. Weight of Bitumen Used (F + G - M)	
O. Weight of Mix Produced (Tons)	1,256.00
P. Percent Bitumen in Mix (N / O x 100)	

METER METHOD

Q. Applied Temperature of Bitumen	310
R. Weight Per Gallon (D) of Bitumen at Applied Temperature	7.867
S. Weight of Mix Produced (tons)	1,256.00

Meter Reads in Weight		Meter Reads in Gallons	
T. Stop (tons)		T. Stop (gallons)	18,898.0
U. Start (tons)		U. Start (gallons)	0.0
V. Net Weight		V. Net Weight	18,898.0
V / S x 100 =	% bitumen in mix	R x (V / S)/2000 x 100 =	5.92 % bitumen in mix

Comments

Figure 4