Method for Field Determination of the Daily Asphalt Binder Content

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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
File No. 9-14

Report No. 14
County Aurora, Ziebach PCN/PROJECT B015 PH 0066(00)15
Test Date 05/03/2016 Inspector Tester, One Contractor Roads, Inc
Percent Bitumen Desired 5.4 - 6.0 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	1.033
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	
E. Gallons in Tank When Check Starts (calibrated stick)	18495	18465
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)	17745	18465
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)	4833.21	
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	4827.21	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	4833.21	Tons		

REMARKS

Figure 1

DETERMINING POUNDS OF BITUMEN PER GALLON

1. _____ X _____ = X 8.328 (1) = _____ lbs. of Bitumen per
   Spec. Gravity of Bitumen Temp. Factor
   Gallon @ temperature

2. 8.4196 X 0.9146 = 7.70 lbs. of Bitumen per
   Wt./Gal. @ 60°F Temp. Factor
   Gallon @ temperature

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
File No.

Asphalt Plant Mix - Spot Check

INFO.

DOT- 66
(06-10)

PROJECT PH 0066(00)15 COUNTY Aurora, Ziebach PCN B015
Field # 01 Date Sampled 05/03/2016 Date Tested 05/03/2016
Inspector Tester, One Contractor Roads, Inc

TANK METHOD

Two Tanks? ☑

	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)	3685	6304
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)	3332	5771
J. Ending Specific Gravity of Bitumen @ 60 F	1.032	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)	3101.80	
P. Percent Bitumen in Mix (N / O x 100)	6.07	

(*) Computed on reverse side

METER METHOD

Q. Applied Temperature of Bitumen 300
R. Weight Per Gallon (L) of Bitumen at Applied Temperature 7.896
S. Weight of Mix Produced (tons) 3101.80

○ Meter Reads in Weight	◉ Meter Reads in Gallons
T. Stop (tons)	T. Stop (gallons)
U. Start (tons)	U. Start (gallons)
V. Net Weight	V. Net Gallons
V / S x 100 =	R x V / S x 100 = % of Bitumen in Mix

Figure 2

Sample ID 2225789
File No.

Asphalt Plant Mix - Spot Check

DOT- 66
(06-10)

PROJECT PH 0066(00)15 COUNTY Aurora, Ziebach PCN B015
Field # 02 Date Sampled 05/03/2016 Date Tested 05/03/2016
Inspector Tester (TEST), One Contractor Roads, Inc

TANK METHOD Two Tanks? ☐

A. Beginning Specific Gravity of Bitumen @ 60 F	
B. Beginning Weight Per Gallon @ 60 F	
C. Temperature of Bitumen in Tank When Check Starts	
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)	
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)	
P. Percent Bitumen in Mix (N / O x 100)	

(*) Computed on reverse side

METER METHOD

Q. Applied Temperature of Bitumen	300
R. Weight Per Gallon (L) of Bitumen at Applied Temperature	0.00
S. Weight of Mix Produced (tons)	1256.00

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 Gallons	
V / S x 100 =	5.81 % of Bitumen in Mix	R x V / S x 100 =	% of Bitumen in Mix

Figure 3

Sample ID 2225791
File No.

Asphalt Plant Mix - Spot Check

INFO.

DOT- 66
(06-10)

PROJECT PH 0066(00)15 COUNTY Aurora, Ziebach PCN B015
Field # 03 Date Sampled 05/03/2016 Date Tested 05/03/2016
Inspector Tester (TEST), One Contractor Roads, Inc

TANK METHOD Two Tanks? ☐

A. Beginning Specific Gravity of Bitumen @ 60 F	
B. Beginning Weight Per Gallon @ 60 F	
C. Temperature of Bitumen in Tank When Check Starts	
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)	
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)	
P. Percent Bitumen in Mix (N / O x 100)	

(*) Computed on reverse side

METER METHOD

Q. Applied Temperature of Bitumen	310
R. Weight Per Gallon (L) of Bitumen at Applied Temperature	7.87
S. Weight of Mix Produced (tons)	1256.00

○ Meter Reads in Weight		◉ Meter Reads in Gallons	
T. Stop (tons)		T. Stop (gallons)	18898.0
U. Start (tons)		U. Start (gallons)	0.0
V. Net Weight		V. Net Gallons	18898.0
V / S x 100 =	% of Bitumen in Mix	R x V / S x 100 =	5.92 % of Bitumen in Mix

Figure 4