1060.01 General. The importance of carefully weighing uncalibrated tank trucks and distributors cannot be overemphasized in the correct calculation of volume when asphalt materials are received by tank truck.

1060.02 Calculating Volume from Net Weight.

1. Shipments of asphalt materials in uncalibrated tank trucks, cars and distributors must be weighed to determine the net weight of the material and the net weight converted to volume at the specified pay temperature.

2. The volume to be paid for will be calculated by using the following formula:

   Gallons to be paid for = Net weight in Lbs. / ( “K” x Specific Gravity)

   Liters to be paid for = Net weight in Kilograms / (“K” x Specific Gravity)

   Where “K” is a variable constant depending upon the coefficients of expansion and the pay temperatures for the various materials. The pay temperatures, coefficients of expansion and the values of “K” are given in Table A.

3. Formulas for calculating pay volume from net weight follow. Select the formula which includes under its heading the grade of material in the transport, car or distributor. The material producer’s previous years average specific gravity shall be used to determine which formula is to be used in making the calculation for 702.02 and 702.03 materials. Where a producer average specific gravity is not available use the specific gravity of the original material shown on the Laboratory report.

   Gallons (Liters) = Net weight Lbs. (kilograms) / ( K x Specific Gravity )
### Table A - Formula Values

<table>
<thead>
<tr>
<th>Item</th>
<th>Material</th>
<th>Specific Gravity [77 oF (25 oC)]</th>
<th>t [oF (oC)]</th>
<th>c</th>
<th>K</th>
</tr>
</thead>
<tbody>
<tr>
<td>702.01</td>
<td>PG Binder w/ or w/o Polymer</td>
<td>Any</td>
<td>300.0 (148.9)</td>
<td>0.00035 (0.00063)</td>
<td>7.690 (0.9215)</td>
</tr>
<tr>
<td>702.02</td>
<td>MC-30, 70, 250, 800, 3000</td>
<td>0.8458 to 0.9621</td>
<td>100.0 (37.8)</td>
<td>0.00040 (0.00072)</td>
<td>8.236 (0.9869)</td>
</tr>
<tr>
<td></td>
<td></td>
<td>0.9622</td>
<td>100.0 (37.8)</td>
<td>0.00035 (0.00063)</td>
<td>8.245 (0.988)</td>
</tr>
<tr>
<td>702.03</td>
<td>CBAE 350, 800; CBAE 350, 800 Special</td>
<td>0.9622</td>
<td>100.0 (37.8)</td>
<td>0.00035 (0.00063)</td>
<td>8.245 (0.988)</td>
</tr>
<tr>
<td></td>
<td></td>
<td>0.8458 to 0.9621</td>
<td>100.0 (37.8)</td>
<td>0.00040 (0.00072)</td>
<td>8.236 (0.9869)</td>
</tr>
<tr>
<td></td>
<td>Primer 20, 100</td>
<td>0.8458 to 0.9621</td>
<td>100.0 (37.8)</td>
<td>0.00040 (0.00072)</td>
<td>8.236 (0.9869)</td>
</tr>
<tr>
<td>702.04</td>
<td>Asphalt Emulsions</td>
<td>0.9622</td>
<td>100.0 (37.8)</td>
<td>0.00035 (0.00063)</td>
<td>8.245 (0.988)</td>
</tr>
<tr>
<td>702.05</td>
<td>Asphalt Primer for Waterproofing</td>
<td>Any</td>
<td>60.0 (15.5)</td>
<td>0.00040 (0.00072)</td>
<td>8.368 (1.0027)</td>
</tr>
</tbody>
</table>

4. Calculations and other pertinent information should be shown on Form MR-575 (attached). Attach this completed form and submit with the invoice for payment for asphalt material where this method of measurement applies. Use this form as a record on contract projects on which asphalt materials are furnished by weight.

1060.03 **Calculating Volume Correction for Actual Product Temperature.** The following information is to be used to calculate the volume of asphalt materials, heating oils, diesel fuels, kerosene and gasoline when tank car, truck transport or distributor calculations are from weights taken at a product temperature different from the specified pay temperature shown under 109.01 Measurement of Quantities.
Table B - Index Of Formulas

<table>
<thead>
<tr>
<th>Specification</th>
<th>Material</th>
<th>Pay Temperature (based on volume)</th>
<th>Formula No.</th>
</tr>
</thead>
<tbody>
<tr>
<td>702.01</td>
<td>PG Binder w/ or w/o polymer</td>
<td>300 °F (148.9 °C)</td>
<td>4</td>
</tr>
<tr>
<td>702.02</td>
<td>MC</td>
<td>100 °F (37.8 °C)</td>
<td>3</td>
</tr>
<tr>
<td>702.03</td>
<td>CBAE</td>
<td>100 °F (37.8 °C)</td>
<td>3</td>
</tr>
<tr>
<td></td>
<td>Primer 20, 100</td>
<td>100 °F (37.8 °C)</td>
<td>3</td>
</tr>
<tr>
<td>702.04</td>
<td>Asphalt Emulsion</td>
<td>100 °F (37.8 °C)</td>
<td>3</td>
</tr>
<tr>
<td>702.05</td>
<td>Asphalt Primer for Waterproofing</td>
<td>60 °F (15.5 °C)</td>
<td>2</td>
</tr>
<tr>
<td>702.07</td>
<td>MWS Emulsion</td>
<td>100 °F (37.8 °C)</td>
<td>3</td>
</tr>
<tr>
<td>702.13</td>
<td>Rubberized Asphalt Emulsion</td>
<td>60 °F (15.5 °C)</td>
<td>3</td>
</tr>
<tr>
<td>ASTM D-975</td>
<td>Diesel Fuel Oils No. 1D &amp; 2D</td>
<td>60 °F (15.5 °C)</td>
<td>2</td>
</tr>
<tr>
<td></td>
<td>Gasoline</td>
<td>60 °F (15.5 °C)</td>
<td>1</td>
</tr>
<tr>
<td>ASTM D-396</td>
<td>Heating Oils No. 1 &amp; 2</td>
<td>60 °F (15.5 °C)</td>
<td>2</td>
</tr>
<tr>
<td>Federal VVK-211-d</td>
<td>Kerosene</td>
<td>60 °F (15.5 °C)</td>
<td>2</td>
</tr>
</tbody>
</table>

Example:

Asphalt Material 702.02, MC-800
Gallons at specified pay temperature, calculated from tank truck or distributor net weights = 6,300 Gal.
Measured temperature of product in tank truck or distributor = 203°F
Average Producer Specific Gravity 77 °F (25 °C) or from Laboratory Report = 0.973
Adjust for actual temperature, MC-800 is covered by Formula 3, Part 1 or 0.00035 per degree F.
Calculate “D” = 0.9640.
Calculate actual volume, 6,300 ÷ 0.9640 = 6,535 net gallons at measured product temperature of 203 °F.
FORMULA 1
VOLUME CORRECTION FOR GASOLINE

Specified pay temperature - 60.0 °F (15.5 °C)
t = Observed product temperature in degrees Fahrenheit (Celsius)
D = Divisor for correcting volumes for temperatures other than 60 °F

Use Part 1 or Part 2 in accordance with Degrees (60F/60F) A.P.I. shown on Laboratory report or producer’s current average.

Formula 1
Part 1

51.0 to 63.9 degrees A.P.I. at 60.0°F (15.5 °C)
Coefficient of Expansion per degree F (C) = 0.00060 (0.00108)

60.0 (15.5) - t (Actual Product Temp F (C)) = A
A x 0.0006 (or .00108 for C) = B
1.0000 + B = D

Formula 1
Part 2

64.0 to 78.9 degrees A.P.I. at 60.0 °F (15.5 °C)
Coefficient of Expansion per degree F (C) = 0.00070 (0.00126)

60.0 (15.5) - Actual Product Temperature F (C) = A
A x 0.00070 (or 0.00126 for C) = B
1.0000 + B = D
FORMULA 2
VOLUME CORRECTION FORMULAS FOR:

702.05 Asphalt Primer for Waterproofing
ASTM D-396 Heating Oils No. 1 and No. 2
ASTM D-975 Diesel Fuel Oils No. 1D and No. 2D
VVK-211-d Kerosene

Specified pay temperature - 60.0 °F (15.5 °C)
t = Observed product temperature in degrees Fahrenheit (Celsius)
D = Divisor for correcting volumes for temperatures other than 60°F

Use Part 1 or Part 2 in accordance with degrees (60 °F/60 °F ) A.P.I. or Specific Gravity (77 °F/25 °C) shown on Laboratory report or producer’s current average.

Formula 2
Part 1

35.0 to 50.9 degrees A.P.I.
Specific Gravity 0.775 to 0.850
Coefficient of Expansion per degree F (C) = 0.00050 (0.00090)

60.0 (15.5) - t (Actual Product Temperature F (C)) = A

A x 0.00050 (or 0.00090 for C) = B

1.0000 + B = D

Formula 2
Part 2

15.0 to 34.9 degrees A.P.I.
Specific Gravity 0.850 to 0.960
Coefficient of Expansion per degree F (C) = 0.00040

60.0 (15.5) - Actual Product Temperature F (C) = A

A x 0.00040 (or 0.00072 for C) = B

1.0000 + B = D
FORMULA 3
VOLUME CORRECTION TABLE FOR:

702.02 MC 30, 70, 250, 800, 3000
702.03 CBAE 350, 800; CBAE 350, 800 Special
702.04 Asphalt Emulsions
702.07 MWS Emulsion
702.13 Rubberized Asphalt Emulsion

Specified pay temperature 100.0 °F (37.8 °C)
t = Observed product temperature in degrees Fahrenheit (Celsius)
D = Divisor for correcting volumes for temperatures other than 100 °F

Use Part 1 or Part 2 in accordance with Specific Gravity (77 °F/25 °C) shown on Laboratory report or producer’s current average.

Formula 3
Part 1

Specific Gravity equal to or greater than 0.9622 at 77 °F (25 °C)
Coefficient of Expansion per degree F (C) = 0.00035 (0.00063)

100.0 (37.8) - t (Actual Product Temperature F (C)) = A
A x 0.00035 (or 0.00063 for C) = B
1.0000 + B = D

Formula 3
Part 2

Specific Gravity Range 0.8458 to 0.9621 (77 °F/25 °C)
Coefficient of Expansion per degree F (C) = 0.00040 (0.00072)

100.0 (37.8) - t (Actual Product Temperature F (C)) = A
A x 0.00040 (or 0.00072 for C) = B
1.0000 + B = D
FORMULA 4
VOLUME CORRECTION TABLE FOR:

702.01 PG Binder w/ or w/o polymer

Specified pay temperature 300.0 °F (148.9 °C)
t = Observed product temperature in degrees Fahrenheit (Celsius)
D = Divisor for correcting volumes for temperatures other than 300.0 °F (148.9 °C)

Coefficient of Expansion per degree F (C) = 0.00035 (0.00063)

Formula 4

\[
300.0 \text{ (148.9)} - t \text{ (Actual Product Temperature F (C))} = A \\
A \times 0.00035 \text{ (or 0.00063 for C)} = B \\
1.000 + B = D
\]
MR-575

CITY OF COLUMBUS, OHIO

ITEM (KIND OF ASPHALT MATERIAL) ________________________________

LOADED AT (PLANT NAME AND LOCATION) ______________________________

PURCHASE ORDER NUMBER (OR PROJECT NO.) ______________________________

DISTRIBUTOR NO. _________ DISTRIBUTOR CAPACITY ___________ GALS.

CITY OF COLUMBUS, OHIO

CALCULATION

GROSS WT. _______________ LBS. __________________ NET WT. LBS

TARE WT. _______________ LBS. _______________ = __________ GALS.

NET WT. _______________ LBS. (__________) X (__________)

FACTOR SP. GRAVITY

CERTIFIED CORRECT

______________________________________________   __________________

CONSUMER’S REPRESENTATIVE ___________________ DATE ________________