Kentucky Method 64-404-~~03~~05
Revised ~~1/8/03~~12/28/04
Supersedes KM 64-404-~~02~~03
Dated ~~12/13/01~~1/8/03

SAMPLING LIQUID ASPHALT MATERIALS

1.   SCOPE:

   1.1.   This method applies to the sampling of liquid asphalt materials at the point of manufacture or the destination from bulk storage tanks, barges, rail cars, truck transports, and distributors.

   1.2.   Since sampling is as important as testing, make every effort to obtain samples which are truly representative of the material sampled.

2.   SAMPLE SIZE:

   2.1.   Provide minimum sample sizes for liquid asphalt materials as follows:

      2.1.1. Performance-graded (PG) binders; two~~, one~~ 1-quart samples.

      2.1.2. Emulsified asphalts, "Primer L", KP-2, KP-4, and KP-6; two~~, one~~ 1-gallon samples.

3.   CONTAINERS:

   3.1.   Types of containers

      3.1.1. For PG binders, KP-2, and KP-6, provide wide-mouth, friction-top cans or square or round cans with screw-lined tops.

      3.1.2. For cationic and anionic emulsified asphalts, KP-4, and "Primer L", provide small-mouth, polyethylene jugs or bottles.

   3.2.   Size of containers: Provide containers of a size corresponding to the required amount of the sample.

   3.3.   Physical condition of containers: Provide new sample containers. Do not use containers which exhibit evidence of solder flux or any other foreign matter or are not clean and dry. Also, do not use containers which have been washed, rinsed, or contain oily residue.

4.   SAMPLING VALVES:

4.1.   Storage and shipping tanks: Ensure each tank has a sampling valve similar in design to either of the valves shown by Figure 2 in AASHTO T 40-02.

4.2.   Tank cars, transports, and distributors: Ensure each delivery vehicle is equipped with a sampling valve similar in design to that shown by Figure 4 in AASHTO T 40-02.

5.   SAMPLING LIQUID ASPHALT MATERIALS:

5.1.   Sampling from an approved valve: Drain at least one gallon of material through the sampling valve prior to obtaining a sample in order to purge the valve of any foreign material. Allow the material to slowly drain from the tank into a clean container of the type and size previously specified.

5.2.   Sampling directly from a line: Obtain samples from loading lines, unloading lines, or circulating lines serving a tank, providing the sample is taken from an approved sampling valve. Do not take samples from the main unloading valve or the end of the discharge hose. It is desirable that the sampling valve be constructed and located so the sample may be taken while material is being pumped. When sampling from the unloading line of a carrier tank, allow sufficient material to unload before taking the sample to purge the line of the previous material. If possible, obtain the sample during the unloading of the middle one-third of the load. The sampling valve should be purged before taking the sample by running a minimum of one gallon of material through the valve. If possible, draw the sample slowly while the material is flowing to represent as much of the tank as possible. When the pump must be stopped to obtain the sample, draw one sample at approximately the one-third point, and draw the check sample at approximately the two-thirds point, of unloading.

5.3.   Sampling from a spray bar or hand wand: Obtain samples from the spray bar or hand wand of a distributor only when an approved sampling valve is not available. Spray at least one gallon of material through the spray-bar nozzle or hand wand prior to obtaining a sample. Spray the material into a clean container of the type and size previously specified.

6.   NUMBER OF SAMPLES REQUIRED FOR LIQUID ASPHALT MATERIALS:

6.1.   Source of sampling: When the sampling takes place at the refinery or terminal for source certification, obtain one sample, and submit it to the testing laboratory.

6.2.   Field or destination: Obtain two samples for project certification. Obtain emulsion samples from the distributor and PG binder samples from the contractor's storage tank or transport tanker. For either type of material, submit both samples to the laboratory for testing.

7.   CARE OF LIQUID ASPHALT MATERIAL AFTER SAMPLING:

7.1.   Immediately seal containers after sampling to avoid possible sample contamination.

7.2.   Do not use water or any solvent (gasoline, diesel fuel, etc.) to aid in the cooling or cleaning of the container. If cleaning is necessary, use a clean, dry cloth.

8.   SAMPLE IDENTIFICATION AND SHIPMENT: Properly identify all samples by completely filling in the appropriate label and attaching it to the container. Carry or ship samples in cartons to the Division of Materials, Frankfort, Kentucky. Pack samples to provide protection during transit. Protect emulsion samples from freezing, and carry them (not ship them) to the laboratory during freezing weather.

9.   GENERAL: Measurement of tank quantity: Record the quantity which the sample represents on the sample identification form. Obtain this quantity from a tank gauge or shipping ticket, if considered accurate. Otherwise, calculate the quantity from the tank measurement reported at 60°F. The "outage" measurement method as described in the attachment is usually the best method.

APPROVED   _____
                         Director
                         Division of Materials

DATE _____1/8/0312/28/04_____

Kentucky Method 64-404-0305
Revised 1/8/0312/28/04
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Attachments

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ATTACHMENT
TABLE 1
QUANTITIES FOR VARIOUS DEPTHS OF
CYLINDRICAL TANKS IN A HORIZONTAL POSITION

% DEPTH FILLED	% OF CAPACITY	% DEPTH FILLED	% OF CAPACITY	% DEPTH FILLED	% OF CAPACITY	% DEPTH FILLED	% OF CAPACITY
1	0.20	26	20.73	51	51.27	76	81.50
2	0.50	27	21.86	52	52.55	77	82.60
3	0.90	28	23.00	53	53.81	78	83.68
4	1.34	29	24.07	54	55.08	79	84.74
5	1.87	30	25.31	55	56.34	80	85.77
6	2.45	31	26.48	56	57.60	81	86.77
7	3.07	32	27.66	57	58.86	82	87.76
8	3.74	33	28.84	58	60.11	83	88.73
9	4.45	34	30.03	59	61.36	84	89.68
10	5.20	35	31.19	60	62.61	85	90.60
11	5.98	36	32.44	61	63.86	86	91.50
12	6.80	37	33.66	62	65.10	87	92.36
13	7.64	38	34.90	63	66.34	88	93.20
14	8.50	39	36.14	64	67.56	89	94.02
15	9.40	40	37.39	65	68.81	90	94.80
16	10.32	41	38.64	66	69.97	91	95.55
17	11.27	42	39.89	67	71.16	92	96.26
18	12.24	43	41.14	68	72.34	93	96.93
19	13.23	44	42.40	69	73.52	94	97.55
20	14.23	45	43.66	70	74.69	95	98.13
21	15.26	46	44.92	71	75.93	96	98.66
22	16.32	47	46.19	72	77.00	97	99.10
23	17.40	48	47.45	73	78.14	98	99.50
24	18.50	49	48.73	74	79.27	99	99.80
25	19.61	50	50.00	75	80.39		

$$Capacity\ of\ Tank\ (in\ gals) = \frac{0.7854\ x\ D^2\ x\ L}{231}$$

where: D = the diameter of the interior of the tank in inches; and
L = the length of the interior of the tank in inches.

NOTE: The volume occupied by any piping, fittings, or other material inside the tank must be deducted from the volume determined from ~~computed by use of~~ the table.

=EXAMPLE=

(1)   Outage (unfilled) measurement = 6'7" = 79"
Diameter of the tank = 8'4" = 100"
Length of the tank = 15'0" = 180"
Interior piping = 30' of 3" pipe, all submerged
Temperature of PG binder = 290 °F

(2)   Gross capacity of the tank = $\frac{0.7854\ x\ (100)^2\ x\ 180}{231}$ = 6120 gallons

Displacement volume of the interior piping = $\frac{0.7854\ x\ (3)^2\ x\ (30\ x\ 12)}{231}$ = 11 gallons

(3)   % depth filled = $\frac{(Diameter - Outage)}{Diameter}$ x 100 =

$\frac{(100-79)}{100}$ x 100 = 21%,

so from Table 1, % of capacity = 15.26.

(4)   Quantity of materials = (0.1526 x 6120) - 11 = 923 gal. @ 290 °F.

(5)   Quantity of materials @ 60 °F
Temperature correction factor from Table 2 = 0.922 for 290 °F.
Quantity @ 60 °F = 0.922 x 923 gallons = 851 gallons.

(6)   When material quantities need to be expressed in pounds mass, multiply the calculated gallons by the appropriate weight per gallon listed below.

(a)   PG 64-22   8.48
~~PG 70-22   8.63~~
PG 76-22   8.68
(b)   "Primer L"   7.67
(c)   Emulsions   8.31

FACTORS FOR CORRECTING SPECIFIC GRAVITIES OF ASPHALT BINDERS AND CUTBACKS TO OPERATING TEMPERATURE
(TEMPERATURES ARE IN °F)

40 = 1.0070	90 = 0.9896	140 = 0.9723	190 = 0.9553	240 = 0.9385	290 = 0.9220
41 = 1.0067	91 = 0.9892	141 = 0.9720	191 = 0.9550	241 = 0.9382	291 = 0.9217
42 = 1.0063	92 = 0.9889	142 = 0.9716	192 = 0.9547	242 = 0.9379	292 = 0.9213
43 = 1.0060	93 = 0.9885	143 = 0.9713	193 = 0.9543	243 = 0.9375	293 = 0.9210
44 = 1.0056	94 = 0.9882	144 = 0.9710	194 = 0.9540	244 = 0.9372	294 = 0.9207
45 = 1.0053	95 = 0.9878	145 = 0.9706	195 = 0.9536	245 = 0.9369	295 = 0.9204
46 = 1.0049	96 = 0.9875	146 = 0.9703	196 = 0.9533	246 = 0.9365	296 = 0.9200
47 = 1.0046	97 = 0.9871	147 = 0.9699	197 = 0.9530	247 = 0.9362	297 = 0.9197
48 = 1.0042	98 = 0.9868	148 = 0.9696	198 = 0.9526	248 = 0.9359	298 = 0.9194
49 = 1.0038	99 = 0.9864	149 = 0.9693	199 = 0.9523	249 = 0.9356	299 = 0.9190
50 = 1.0035	100 = 0.9861	150 = 0.9689	200 = 0.9520	250 = 0.9352	300 = 0.9187
51 = 1.0031	101 = 0.9857	151 = 0.9686	201 = 0.9516	251 = 0.9349	301 = 0.9184
52 = 1.0028	102 = 0.9854	152 = 0.9682	202 = 0.9513	252 = 0.9346	302 = 0.9181
53 = 1.0024	103 = 0.9851	153 = 0.9679	203 = 0.9509	253 = 0.9342	303 = 0.9177
54 = 1.0021	104 = 0.9847	154 = 0.9675	204 = 0.9506	254 = 0.9339	304 = 0.9174
55 = 1.0017	105 = 0.9844	155 = 0.9672	205 = 0.9503	255 = 0.9336	305 = 0.9171
56 = 1.0014	106 = 0.9840	156 = 0.9669	206 = 0.9499	256 = 0.9332	306 = 0.9167
57 = 1.0010	107 = 0.9837	157 = 0.9665	207 = 0.9496	257 = 0.9329	307 = 0.9164
58 = 1.0007	108 = 0.9833	158 = 0.9662	208 = 0.9493	258 = 0.9326	308 = 0.9161
59 = 1.0003	109 = 0.9830	159 = 0.9658	209 = 0.9489	259 = 0.9322	309 = 0.9158
60 = 1.0000	110 = 0.9826	160 = 0.9655	210 = 0.9486	260 = 0.9319	310 = 0.9154
61 = 0.9997	111 = 0.9823	161 = 0.9652	211 = 0.9483	261 = 0.9316	311 = 0.9151
62 = 0.9993	112 = 0.9819	162 = 0.9648	212 = 0.9479	262 = 0.9312	312 = 0.9148
63 = 0.9990	113 = 0.9816	163 = 0.9645	213 = 0.9476	263 = 0.9309	313 = 0.9145
64 = 0.9986	114 = 0.9813	164 = 0.9641	214 = 0.9472	264 = 0.9306	314 = 0.9141
65 = 0.9983	115 = 0.9809	165 = 0.9638	215 = 0.9469	265 = 0.9302	315 = 0.9138
66 = 0.9979	116 = 0.9806	166 = 0.9635	216 = 0.9466	266 = 0.9299	316 = 0.9135
67 = 0.9976	117 = 0.9802	167 = 0.9631	217 = 0.9462	267 = 0.9296	317 = 0.9132
68 = 0.9972	118 = 0.9799	168 = 0.9628	218 = 0.9459	268 = 0.9293	318 = 0.9128
69 = 0.9969	119 = 0.9795	169 = 0.9624	219 = 0.9456	269 = 0.9289	319 = 0.9125
70 = 0.9965	120 = 0.9792	170 = 0.9621	220 = 0.9452	270 = 0.9286	320 = 0.9122
71 = 0.9962	121 = 0.9788	171 = 0.9618	221 = 0.9449	271 = 0.9283	321 = 0.9118
72 = 0.9958	122 = 0.9785	172 = 0.9614	222 = 0.9446	272 = 0.9279	322 = 0.9115
73 = 0.9955	123 = 0.9782	173 = 0.9611	223 = 0.9442	273 = 0.9276	323 = 0.9112
74 = 0.9951	124 = 0.9778	174 = 0.9607	224 = 0.9439	274 = 0.9273	324 = 0.9109
75 = 0.9948	125 = 0.9775	175 = 0.9604	225 = 0.9436	275 = 0.9269	325 = 0.9105
76 = 0.9944	126 = 0.9771	176 = 0.9601	226 = 0.9432	276 = 0.9266	
77 = 0.9941	127 = 0.9768	177 = 0.9597	227 = 0.9429	277 = 0.9263	PROCEDURE
78 = 0.9937	128 = 0.9764	178 = 0.9594	228 = 0.9426	278 = 0.9259	Multiply the
79 = 0.9934	129 = 0.9761	179 = 0.9590	229 = 0.9422	279 = 0.9256	specific gravity
80 = 0.9930	130 = 0.9758	180 = 0.9587	230 = 0.9419	280 = 0.9253	of the asphalt
81 = 0.9927	131 = 0.9754	181 = 0.9584	231 = 0.9416	281 = 0.9250	material at 60 °F
82 = 0.9923	132 = 0.9751	182 = 0.9580	232 = 0.9412	282 = 0.9246	times the factor
83 = 0.9920	133 = 0.9747	183 = 0.9577	233 = 0.9409	283 = 0.9243	corresponding to
84 = 0.9916	134 = 0.9744	184 = 0.9574	234 = 0.9405	284 = 0.9240	the operating
85 = 0.9913	135 = 0.9740	185 = 0.9570	235 = 0.9402	285 = 0.9236	temperature.
86 = 0.9909	136 = 0.9737	186 = 0.9567	236 = 0.9399	286 = 0.9233	
87 = 0.9906	137 = 0.9734	187 = 0.9563	237 = 0.9395	287 = 0.9230	
88 = 0.9902	138 = 0.9730	188 = 0.9560	238 = 0.9392	288 = 0.9227	
89 = 0.9899	139 = 0.9727	189 = 0.9557	239 = 0.9389	289 = 0.9223	

Temperatures below 225 °F are for cutbacks, and temperatures at or above 225 °F are for asphalt binders.