Test Procedure for

TEST FOR CURING INDEX OF CUTBACK ASPHALTS

TxDOT Designation: Tex-517-C

Effective Date: August 1999

1. SCOPE

1.1 This method provides a means for calculating the curing index of cutback asphalts. The Curing Index is an empirical factor derived from the distillation data, which takes into account the amount of volatility of the diluents and the characteristics of the base asphalt contained in the rapid curing cutback material. In essence, the lower the numerical value of the Curing Index, the more rapidly the material will cure. This test method includes example calculations for clarity.

1.2 The values given in parentheses (if provided) are not standard and may not be exact mathematical conversions. Use each system of units separately. Combining values from the two systems may result in nonconformance with the standard.

2. CALCULATING CURING INDEXES

2.1 Obtain a representative sample of the material and determine the distillation data in accordance with ASTM D 402.

2.2 Record the complete distillation data as shown in Columns (1) and (2) of Table 1.

2.3 Experience has shown that the average cured-out point for RC-2 cut-back asphalts meeting Texas specifications is at the point where 80% of the volatiles to 360°C (680°F) have distilled off.

2.3.1 Calculate the cured-out point as 80% of the total distillate to 360°C (680°F), i.e., 80% of the percent by volume of total cutback to 360°C (680°F).

2.3.2 Record this value as the final fraction as shown in Column (2) of Table 1.

Table 1—Calculation Table

Temp. °C (°F) (1)	% by Volume Total Cutback (2)	D% (3)	K (4)	Products (5)
IBP = 149 (300)				
160 (320)	0.5	0.5	0.23	0.11
175 (347)	3.0	2.5	0.30	0.75
190 (374)	6.5	3.5	0.51	1.78
225 (437)	14.0	7.5	1.30	9.75
260 (500)	18.5	4.5	4.46	20.07
315.6 (600)	21.0			
360 (680)	24.0			
Final Fraction				
275 (530)	19.2	0.7	13.30	9.31
			Total:	41.77
			Curing Index :	42

2.4 The cured-out temperature (the final fraction temperature) is the temperature at which the cured-out point is reached. In this example, it is where 19.2% of the volatiles have distilled off.

2.4.1 Calculate the cured-out temperature by interpolating between the temperatures of the two fractions preceding and following the final fraction.

2.4.2 Record this value as the final temperature as shown in Column (1) of Table 1.

2.5 Record the difference, D%, between percent of total cutback for successive cuts of the distillation up to and including the final fraction in Column (3) of Table 1.

2.6 Obtain the K-value, from Table 2, for each interval and record it in Column (4), as shown in Table 1, up to and including the final fraction.

2.7 Calculate the products of Columns (3) and (4) and record them in Column (5), as in Table 1.

2.8 Calculate the sum of Column (5) of Table 1 to the nearest unit. This is the Curing Index.

2.9 *Example Calculations:*

2.9.1 Calculate the cured-out point as indicated in Section 2.3:

80% of 24 = 0.8 × 24 = 19.2.

2.9.2 Calculate the cured-out temperature by interpolation, as indicated in Section 2.4:

$$\frac{(19.2-18.5)(315.6-260)}{21.0-18.5}+260=276\,^{\circ}C$$
$$=275\,^{\circ}C \text{ to the nearest } 5\,^{\circ}C$$
$$=530\,^{\circ}F \text{ to the nearest } 10\,^{\circ}F$$

2.9.3 Calculate the D% for each fraction as indicated in Section 2.5. Here, the D% for the final fraction is 19.2 - 18.5 = 0.7.

2.9.4 Determine the K-value, as indicated in Section 2.6, from Table 2. Here, the initial fraction's boiling point interval is 149–160°C (300–320°F), so it has a K-value of 0.23. Likewise, the final fraction has a K-value of 13.30, for the 260–277°C (500–530°F) interval.

3. K-VALUES FOR BOILING POINT INTERVALS

Table 2— K-Value Table

Interval °C	Interval °F	K-value	Interval °C	Interval °F	K-value
	Initial Cuts			**Middle Cuts**	
93–160	200–320	0.05	160–175	320–347	0.30
99–160	210–320	0.08	175–190	347–374	0.51
104–160	220–320	0.09	190–225	374–437	1.30
110–160	230–320	0.10	225–260	437–500	4.46
116–160	240–320	0.11	260–315.6	500–600	26.00
121–160	250–320	0.13			
127–160	260–320	0.14		**Final Cuts**	
132–160	270–320	0.16	225–232	437–450	2.90
138–160	280–320	0.18	225–238	437–460	3.25
143–160	290–320	0.20	225–243	437–470	3.39
149–160	300–320	0.23	225–249	437–480	3.57
154–160	310–320	0.25	225–254	437–490	3.97
160–175	320–347	0.30	225–260	437–500	4.46
166–175	330–347	0.34	260–266	500–510	11.10
171–175	340–347	0.36	260–271	500–520	12.20
177–190	350–374	0.52	260–277	500–530	13.30
182–190	360–374	0.58	260–282	500–540	13.80
193–225	380–437	1.45	260–288	500–550	15.60
199–225	390–437	1.63	260–293	500–560	17.20
204–225	400–437	1.81	260–299	500–570	19.40
210–225	410–437	1.95	260–304	500–580	21.70
216–225	420–437	2.16	260–310	500–590	24.10
221–225	430–437	2.35	260–316	500–600	26.00
227–260	440–500	5.10	260–321	500–610	91.00
232–260	450–500	5.70	260–327	500–620	106.00
238–260	460–500	6.50			
243–260	470–500	7.15			
249–260	480–500	7.95			
254–260	490–500	8.90			