

**FHWA Superpave Specifications**  
**Performance Graded Binder Specifications**

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Performance Grade	PG 52						PG 58				PG 64					PG 70					
	-10	-16	-22	-28	-34	-40	-46	-16	-22	-28	-34	-40	-16	-22	-28	-34	-40	-10	-16	-22	-28
Average 7-day Maximum Pavement Design Temperature, °C <sup>a</sup>	<52						<58				<64					<70					
Minimum Pavement Design Temperature, °C <sup>a</sup>	>-10	>-16	>-22	>-28	>-34	>-40	>-46	>-16	>-22	>-28	>-34	>-40	>-16	>-22	>-28	>-34	>-40	>-10	>-16	>-22	>-28
Original Binder																					
Flash Point Temp, T48: Minimum °C	230																				
Viscosity, ASTM D 4402: <sup>b</sup> Maximum, 3 Pa·s (3000 cP), Test Temp, °C	135																				
Dynamic Shear, TP5: <sup>c</sup> G*/sin δ, Minimum, 1.00 kPa Test Temperature @ 10 rad/s, °C	52						58				64					70					
Rolling Thin Film Oven (T240) or Thin Film Oven (T179) Residue																					
Mass Loss, Maximum, %	1.00																				
Dynamic Shear, TP5: G*/sin δ, Minimum, 2.20 kPa Test Temp @ 10 rad/sec, °C	52						58				64					70					
Pressure Aging Vessel Residue (PP1)																					
PAV Aging Temperature, °C <sup>d</sup>	90						100				100					100(110)					
Dynamic Shear, TP5: G*/sin δ, Maximum, 5000 kPa Test Temp @ 10 rad/sec, °C	25	22	19	16	13	10	7	25	22	19	16	13	28	25	22	19	16	34	31	28	25
Physical Hardening <sup>e</sup>	Report																				
Creep Stiffness, TP1: <sup>f</sup> S, Maximum, 300 MPa m-value, Minimum, 0.300 Test Temp, @ 60 sec, °C	0	-6	-12	-18	-24	-30	-36	-6	-12	-18	-24	-30	-6	-12	-18	-24	-30	0	-6	-12	-18
Direct Tension, TP3: <sup>f</sup> Failure Strain, Minimum, 1.0% Test Temp @ 1.0 mm/min, °C	0	-6	-12	-18	-24	-30	-36	-6	-12	-18	-24	-30	-6	-12	-18	-24	-30	0	-6	-12	-18

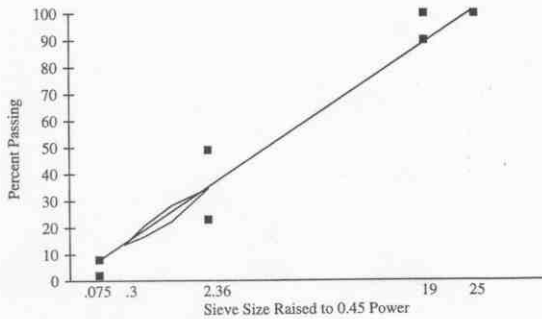
**Notes:**

- Pavement temperatures can be estimated from air temperatures using an algorithm contained in the SUPERPAVE software program or may be provided by the specifying agency, or by following the procedures as outlined in PPX.
- This requirement may be waived at the discretion of the specifying agency if the supplier warrants that the asphalt binder can be adequately pumped and mixed at temperatures that meet all applicable safety standards.
- For quality control of unmodified asphalt cement production, measurement of the viscosity of the original asphalt cement may be substituted for dynamic shear measurements of G\*/sin δ at test temperatures where the asphalt is a Newtonian fluid. Any suitable standard means of viscosity measurement may be used, including capillary or rotational viscometry (AASHTO T 201 or T 202).
- The PAV aging temperature is based on simulated climatic conditions and is one of three temperatures 90° C, 100° C or 110° C. The PAV aging temperature is 100° C for PG 58- and above, except in desert climates, where it is 110° C.
- Physical Hardening - TP 1 is performed on a set of asphalt beams according to Section 13.1, except the conditioning time is extended to 24 hrs ± 10 minutes at 10° C above the minimum performance temperature. The 24-hour stiffness and m-value are reported for information purposes only.
- If the creep stiffness is below 300 MPa, the direct tension test is not required. If the creep stiffness between 300 and 600 MPa the direct tension failure strain requirement can be used in lieu of the creep stiffness requirement. The m-value requirement must be satisfied in both cases.

## Superpave Aggregate Gradations

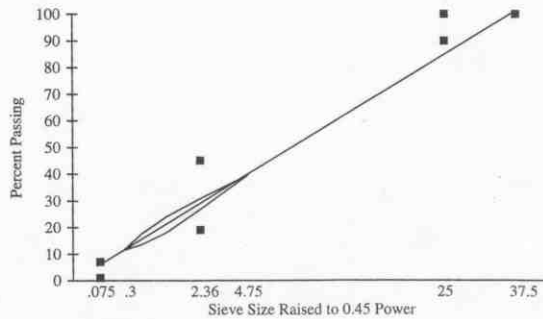
### 19 MM NOMINAL SIZE

Sieve, mm	Control Points		Restricted Zone Boundary	
			Minimum	Maximum
25		100.0		
19	90.0	100.0		
12.5				
9.5				
4.75				
2.36	23.0	49.0	34.6	34.6
1.18			22.3	28.3
0.600			16.7	20.7
0.300			13.7	13.7
0.150				
0.075	2.0	8.0		



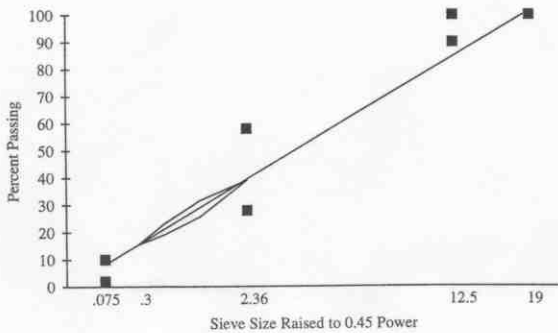
### 25 MM NOMINAL SIZE

Sieve, mm	Control Points		Restricted Zone Boundary	
			Minimum	Maximum
37.5		100.0		
25	90.0	100.0		
19				
12.5				
9.5				
4.75			39.5	39.5
2.36	19.0	45.0	26.8	30.8
1.18			18.1	24.1
0.600			13.6	17.6
0.300			11.4	11.4
0.150				
0.075	1.0	7.0		



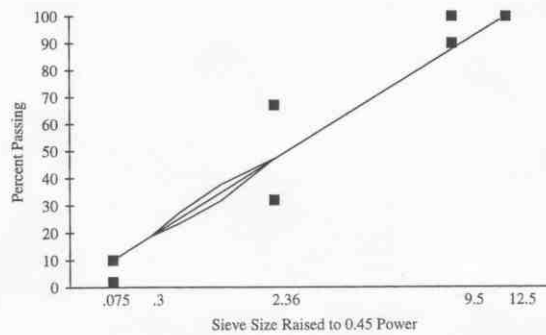
### 12.5 MM NOMINAL SIZE

Sieve, mm	Control Points		Restricted Zone Boundary	
			Minimum	Maximum
19		100.0		
12.5	90.0	100.0		
9.5				
4.75				
2.36	28.0	58.0	39.1	39.1
1.18			25.6	31.6
0.600			19.1	23.1
0.300			15.5	15.5
0.150				
0.075	2.0	10.0		



### 9.5 MM NOMINAL SIZE

Sieve, mm	Control Points		Restricted Zone Boundary	
			Minimum	Maximum
12.5		100.0		
9.5	90.0	100.0		
4.75				
2.36	32.0	67.0	47.2	47.2
1.18			31.6	37.6
0.600			23.5	27.5
0.300			18.7	18.7
0.150				
0.075	2.0	10.0		



## Superpave Aggregate Specifications

### COARSE AGGREGATE ANGULARITY

Coarse Aggregate Angularity:		
Traffic, million ESALs	Depth from Surface	
	< 100 mm	> 100 mm
< 0.3	55/-	-/-
< 1	65/-	-/-
< 3	75/-	50/-
< 10	85/80	60/-
< 30	95/90	80/75
< 100	100/100	95/90
≥ 100	100/100	100/100

Note: "85/80" denotes that 85 % of the coarse aggregate has one fractured face and 80 % has two fractured faces.

### FINE AGGREGATE ANGULARITY

Fine Aggregate Angularity:		
Traffic million, ESALs	Depth from Surface	
	< 100 mm	> 100 mm
< 0.3	-	-
< 1	40	-
< 3	40	40
< 10	45	40
< 30	45	40
< 100	45	45
≥ 100	45	45

Note: Criteria are presented as percent air voids in loosely compacted fine aggregate.

### FLAT AND ELONGATED PARTICLES

Flat, Elongated Particles	
Traffic, million ESALs	Percent
< 0.3	-
< 1	-
< 3	10
< 10	10
< 30	10
< 100	10
≥ 100	10

Note: Criteria are presented as maximum percent by weight of flat and elongated particles.

### CLAY CONTENT

Clay Content	
Traffic, million ESALs	Sand Equivalent, minimum
< 0.3	40
< 1	40
< 3	40
< 10	45
< 30	45
< 100	50
≥ 100	50

## Superpave Compactive Effort Specifications

Table VI-13. Gyratory Compactive Effort

Design ESALs (millions)	Average Design High Air Temperature											
	<39°C			39° - 40°C			41° - 42°C			43° - 44°C		
	N <sub>ini</sub>	N <sub>des</sub>	N <sub>max</sub>	N <sub>ini</sub>	N <sub>des</sub>	N <sub>max</sub>	N <sub>ini</sub>	N <sub>des</sub>	N <sub>max</sub>	N <sub>ini</sub>	N <sub>des</sub>	N <sub>max</sub>
< 0.3	7	68	104	7	74	114	7	78	121	7	82	127
0.3 - 1	7	76	117	7	83	129	7	88	138	8	93	146
1 - 3	7	86	134	8	95	150	8	100	158	8	105	167
3 - 10	8	96	152	8	106	169	8	113	181	9	119	192
<b>10 - 30</b>	<b>8</b>	<b>109</b>	<b>174</b>	9	121	195	9	128	208	9	135	220
30 - 100	9	126	204	9	139	228	9	146	240	10	153	253
> 100	9	142	233	10	158	262	10	165	275	10	172	288