Effects of Mineral Powder on Performance of Warm Reclaimed Asphalt Mixture

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Abstract

The three kinds of tests are used to further study the effect of the amount of mineral powder in this mixture de Firstly, comparing the relationship of the content of mineral powder and asphalt bitumen membrane thickness at diff asphalt content, through film thickness to determine the range of gradation and asphalt content in laboratory tests, Gra and Grade D, asphalt content 2.6% 3.4% and 3.8% are set for the benchmark, then fatigue properties of the test are ca out in the established range, the result show that asphalt film thickness decreases with the addition of mineral powder result also show that fatigue properties of asphalt rubber mixture will reduced, when mineral powder added in, espe when the asphalt content is high.

keywords: mineral powder; warm reclaimed asphalt; mixture; performance

1. Introduction

The 3.3% new asphalt dosage is required in this study, the new material gradation is presented in Table1.

Table 1. Gradation value of new aggregate

mesh size (mm)	16	13.2	9.5	4.75	2.36	0.075
passing rate (%)	100	90	85	65	50	0-5

2. The relationship between the amount of mineral powder and the asphalt film thickness

Generally, the thinner asphalt film thickness attribute to the higher porosity of asphalt mixture, and the greater hydrodynamic pressure of the road surface result in the lower aging resistance of the asphalt mixture. From table 2,it can be seen only grade D have positive effect under the condition of maintaining dosage usage 3.3% and the asphalt film thickness more than 8μm.

Table 2. Results of asphalt film thickness

Asphalt content (%)	Grading	mean porosity (%)	VMA	Asphalt film thickness (μm)
2.6	A	5.812	13.52	5.409
	B	5.344	13.376	6.210
	C	4.980	13.848	6.399
	D	4.720	14.580	7.074
3.4	A	4.148	12.504	5.787
	B	4.168	12.672	6.894
	C	4.257	13.180	7.740
	D	4.108	13.824	9.135
3.8	A	3.218	12.528	9.087
	B	3.940	12.736	9.059
	C	3.646	13.032	10.978
	D	3.478	14.504	10.608

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3. Effect of mineral powder on fatigue properties of regenerated asphalt mixture

The result of fatigue test is listed in Table 3, and reflect obviously in the histogram shown in Figure 1.

Table 3. Fatigue test results

Asphalt content (%)	Grading	Porosity (%)	Asphalt film thickness (μm)	Initial stiffness modulu (MPa)	Strain level	Fatigue times
2.6	A	5.616	5.202	4762	500	5690
				4643	1000	3390
				4752	1500	1010
	D	4.212	7.947	4428	500	6690
				4329	1000	3720
				4530	1500	1570
3.4	A	5.148	5.787	4212	500	12670
				4318	1000	6390
				4381	1500	3230
	D	4.108	9.135	4123	500	23630
				4087	1000	13350
				4007	1500	8040
3.8	A	4.212	6.579	3760	500	26500
				3649	1000	17210
				3693	1500	10870
	D	2.772	8.582	3353	500	42430
				3384	1000	32340
				3240	1500	21130

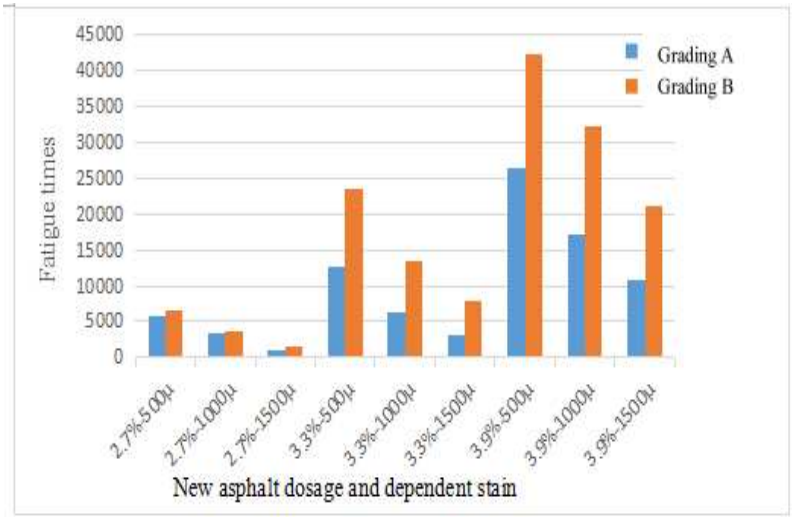

Figure 1. Fatigue test results of two grades

4. Conclusions

The use of mineral powder has negative effects on the performance of warm reclaimed asphalt mixture, and the amount of mineral powder should be reduced as far as possible.

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