

INTISARI

Penuaan aspal (*ageing bitumen*) adalah salah satu penyebab menurunnya kekuatan pada campuran *Hot Rolled Asphalt (HRA)* yang merupakan campuran aspal bergradasi senjang (*gap-graded*), dimana sangat tergantung dari hasil pencampuran, pengangkutan, penghamparan dan pemadatan serta kinerja jalan selama masa pelayanan. Terjadinya penuaan aspal akan mengakibatkan permukaan lapis perkerasan akan berubah bentuk dan penguapan, sehingga kekuatannya akan berkurang. Untuk mengatasi hal tersebut diperlukan usaha-usaha pencegahan antara lain dengan melakukan variasi penambahan aspal pada kadar aspal optimum. Hal ini dilakukan agar didapat suatu rancangan campuran yang mampu menerima beban lalu lintas tanpa terjadi kerusakan. Penelitian ini bertujuan untuk mengetahui pengaruh penambahan aspal terhadap proses penuaan aspal pada campuran *HRA* yang ditinjau terhadap *Short Term Oven Ageing (STOA)* dan *Long Term Oven Ageing (LTOA)*.

Penelitian ini dilakukan dengan membuat benda uji *STOA* dan *LTOA* pada campuran *HRA* dengan penambahan aspal 0,25 %, 0,50 % dan 1,00 % dari kadar aspal optimum (6,54 %) terhadap total campuran, sehingga didapat variasi kadar aspal menjadi 6,74 %, 7,04 % dan 7,54 %. Benda uji dilakukan pada kondisi *STOA* dan *LTOA* dengan mengikut prosedur yang diadopsi dari *Strategic Highway Research Program (SHRP)* pada proyek A-003A, Pengujian kekuatan dilakukan dengan metode *Marshall Test* pada benda uji standard dan pada benda uji dengan variasi perendaman 24 jam, 48 jam dan 96 jam, dan pengujian *Cantabro Test*.

Hasil penelitian menunjukkan bahwa karakteristik Marshall didapat nilai maksimum pada penambahan aspal 1,00 % untuk kondisi *STOA* dengan nilai *density* 2,342 gr/cc, *VMA* 17,76 %, *VITM* 2,96 %, *VFWA* 83,36 %, Stabilitas 2118,40 kg, *flow* 4,53 mm dan *MQ* 467,32 kg/mm sedangkan kondisi *LTOA* nilai maksimum pada penambahan aspal 0,50 % dengan nilai *density* 2,326 gr/cc, *VMA* 17,88 %, *VITM* 4,32 %, *VFWA* 75,89 %, Stabilitas 2386,17 kg, *flow* 3,80 mm dan *MQ* 628,23 kg/mm. Durabilitas pada perendaman 48 jam pada penambahan aspal 1,00 % maksimum pada nilai stabilitas 1912,94 kg dan nilai *RMS* 90,30 % untuk kondisi *STOA* dan penambahan aspal 0,50 % maksimum pada nilai stabilitas 1857,25 kg dan nilai *RMS* 77,83 % untuk kondisi *LTOA*. Persentase kehilangan massa setelah 300 kali putaran menunjukkan penambahan aspal 0,50 % massa yang tersisa 95,88 % untuk *STOA* dan penambahan aspal 1,00 % massa yang tersisa 93,95 % untuk *LTOA*, lebih rentan terhadap terjadinya desintegrasi oleh lalu lintas.

ABSTRACT

Ageing of bitumen is one of the reasons in decreasing the strength of *Hot Rolled Asphalt (HRA)* mixture as a gap-graded asphaltic mixture. It depends on the result during mixing, transportation, compacting and spreading, also the road performance during the service life. The ageing of bitumen resulting the deformation and evaporation of the asphalt surfacing, thus decreasing the strength, thereby needed some prevention such as with variation the addition of asphalt content on the optimum asphalt content can be done to get a mixture design with traffic burdening capability without any damage. The objective of this research to study the influence addition of asphalt to the ageing bitumen at the *HRA* mixture evaluated to *Short Term Oven Ageing (STOA)* and the *Long Term Oven Ageing (LTOA)*.

This research was performed by manufacturing the *STOA* and *LTOA* samples at the *HRA* mixture by the addition of asphalt of 0.25 %, 0.50 % and 1.00 % more than the optimum asphalt content (6.54 %), hence the asphalt content variation became 6.74 %, 7.04 % and 7.54 %. The sample was conditioned by *STOA* and *LTOA* in accordance to the procedure of *Strategic Highway Research Program (SHRP)* at the project of A-003A. The examination of strength of the mixture was conducted by using Marshall Test method on the unconditioned and conditioned with Immersion specimens with the variation of the Immersion period of 24, 48 and 96 hours, and also performed *Cantabro Test*.

The results of this research indicated that based on the Marshall characteristics obtained the maximum value at the addition of asphalt was at 1.00 %, at the *STOA* condition, the value of density was 2.342 gr/cc, the *VMA* value was 17.76 %, the *VITM* value was 2.96 %, *VFWA* value was 83.36 %, the stability value was 2118.40 kg, the *flow* value was 4.53 mm and the *MQ* value was 467.32 kg/mm. At the *LTOA* condition obtained that the maximum value of the addition of asphalt was at 0.50 %, the *density* value was 2.326 gr/cc, the *VMA* value was 17.88 %, the *VITM* value was 4.32 %, *VFWA* value was 75.89 %, the stability value was 2386.17 kg, the flow value was 3.80 mm and the *MQ* value was 628.23 kg/mm. The Durability value to the immersion of 48 hour by the addition of asphalt at 1.00 % obtained the maximum value at the *stability* value of 1912.94 kg and the *RMS* of 90.30 % to the of *STOA* condition and the addition of asphalt 0.50 %, obtained the maximum value at the *stability* value of 1857.25 kg and the *RMS* of 77.83 % to the *LTOA* condition. The percentage of mass retained after 300 times of rotation showed that the addition of asphalt at 0.50 %, the mass retained 95.88 % for the *STOA* and the addition of asphalt at 1.00 %, the mass retained 93.95 % for the *LTOA*, which less strength to the disintegration by the traffic.