

## INTISARI

*Stone Matrix Asphalt* (SMA), merupakan jenis campuran beraspal panas yang dapat digunakan sebagai lapis permukaan perkerasan jalan. SNI 8129:2015 tentang Spesifikasi *Stone Matrix Asphalt* (SMA), merupakan standar baru yang mengacu pada AASHTO M 325-08 “*Standard Specification for Stone Matrix Asphalt* (SMA)” dan hasil penelitian yang telah dilakukan oleh PUSJATAN Kementerian Pekerjaan Umum. Penelitian dalam skala laboratorium diperlukan untuk mengetahui apakah spesifikasi ini dapat diimplementasikan menggunakan aspal penetrasi 60/70, sehingga menghasilkan campuran SMA yang memiliki karakteristik sesuai dengan persyaratan-persyaratan SNI 8129:2015.

Pada penelitian ini, pengujian dilakukan terhadap variasi gradasi agregat ; batas atas, nilai tengah dan batas bawah pada masing-masing campuran SMA halus dan campuran SMA kasar yang seluruhnya bergradasi senjang. Benda uji dalam penelitian ini dirancang berdasarkan metode perancangan Marshall, karakteristik *draindown* dan analisa volumetrik meliputi  $VCA_{DRC}$ ,  $VCA_{MIX}$ , VMA, VITM sebagai parameter utama penetapan gradasi optimum guna menilai kelayakan gradasi tiap jenis campuran SMA. Kadar aspal optimum (KAO) ditentukan untuk setiap gradasi optimum campuran SMA sesuai ketentuan perancangan kadar aspal dari *Asphalt Institute Manual Series No. 2* (MS-2) dengan mempertimbangkan batasan kadar aspal minimum 6,0% dan maksimum 7,0%. Durabilitas tiap jenis campuran SMA pada gradasi optimum dengan KAO, diketahui dengan melakukan *Marshall Test* dan *Indirect Tensile Strength* (ITS) untuk mendapatkan *Index of Retained Strength* (IRS) dan *Tensile Strength Ratio* (TSR), pengujian-pengujian ini juga dilakukan sebagai cara untuk memverifikasi KAO yang digunakan.

Berdasarkan hasil pengujian, nilai *draindown* seluruh variasi gradasi agregat campuran SMA pada kadar aspal rencana tidak melebihi 0,3% dari berat campuran, yang berarti proporsi bahan tambah yang digunakan telah mencukupi. *Stone on stone contact* telah terbentuk pada seluruh variasi gradasi agregat campuran SMA ( $VCA_{MIX} < VCA_{DRC}$ ), namun persyaratan terbentuknya gradasi optimum hanya dapat dipenuhi campuran SMA halus pada gradasi nilai tengah, sedangkan campuran SMA kasar tidak dapat memenuhi persyaratan tersebut karena nilai VMA yang terlalu rendah. Pemeriksaan durabilitas campuran SMA sekaligus verifikasi KAO yang digunakan, menunjukkan hasil IRS dan TSR yang memenuhi ketentuan spesifikasi dengan masing-masing  $\geq 90\%$  dan  $\geq 80\%$  pada KAO 6,9%. Jumlah bahan pengikat yang cukup besar menjamin keawetan campuran SMA terhadap potensi retakan akibat beban tarik dan stabilitas sisa setelah perendaman.

Kata Kunci : Campuran SMA, Gradasi Senjang, *Draindown*, *Stone on Stone Contact*, Gradasi Optimum

## ABSTRACT

Stone Matrix Asphalt (SMA) is a type of hot mixture asphalt which can be used as pavement surface layer. SNI 8129:2015 set the specification of Stone Matrix Asphalt (SMA), a new standard that refers to AASHTO M 325-08 of "Standard Specification for Stone Matrix Asphalt (SMA)" and the results of study that was conducted by PUSJATAN from the Ministry of Public Works. Research in laboratory scale needs to be conducted to ensure whether this specification can be implemented with 60/70 penetration asphalt bitumen, thus the SMA mixture will have characteristic according to the requirements of SNI 8129:2015.

In this research, the test was conducted on various fine and coarse aggregate gradation ; the upper limit, the middle limit and the lower limit of each SMA mixture which entirely considered as gap gradation. The test object in this research was designed based on Marshall method, draindown characteristics and volumetric analysis which covers the  $VCA_{DRC}$ ,  $VCA_{MIX}$ , VMA, and VITM as the main parameter to determine optimum gradation as the assessment of gradation feasibility of each SMA mixture type. The optimum asphalt content (OAC) was determined for each gradation based on optimum mixture design of SMA asphalt content of the Asphalt Institute Manual Series No. 2 (MS-2) which consider the minimum asphalt content limit of 6.0% and a maximum of 7.0%. Durability of each SMA mixture type in optimum gradation with OAC is determined by Marshall Test and Indirect Tensile Strength (ITS) to acquire Index of Retained Strength (IRS) and Tensile Strength Ratio (TSR), these tests were also conducted to verify the OAC.

According the test results, draindown value of aggregate gradation of various SMA mixtures on the initial asphalt content does not exceed 0.3% of the mixture weight, which means the proportion of additive material that were used is sufficient. Stone on stone contact has been formed on all various aggregate gradation of SMA mixture ( $VCA_{MIX} < VCA_{DRC}$ ), but the optimum gradation formation requirement can only be fulfilled by fine SMA mixture gradation of the middle value, while the coarse SMA mixture cannot meet the requirement because the VMA value is too low. Examination of SMA mixture durability and verification of OAC mixture that were used shows the results of IRS and TSR that meet specifications of  $\geq 90\%$  and  $\geq 80\%$  respectively in OAC of 6.9%. The high amount of binder ensures the durability of SMA mixtures has sufficient ability to overcome the potential cracks due to tensile load and retained stability on the post immersion.

**Keywords** : SMA Mixture, Gap Gradation, Draindown, Stone on Stone Contact, Optimum gradation