

KARAKTERISTIK MARSHALL ASPAL MODIFIKASI DENGAN PENAMBAHAN PLASTIK LOW DENSITY POLYETHYLENE (LDPE)

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ABSTRAK

Perkerasan jalan adalah campuran antara agregat berupa batu kali, batu pecah, batu belah, dan hasil samping peleburan baja dengan bahan ikat aspal, semen, dan tanah liat, yang digunakan untuk melayani beban lalu lintas. Aspal digunakan dalam struktur perkerasan lentur karena hasil akhirnya yang baik, nyaman, dan mudah dikerjakan. Di samping kelebihan aspal tersebut, aspal memiliki kekurangan yaitu lama-kelamaan akan mengalami deformasi setelah mengalami pembebahan. Salah satu cara untuk mengatasi kekurangan aspal tersebut yaitu dengan penambahan bahan aditif. Penelitian ini menggunakan plastik jenis *Low Density Polyethylene* (LDPE) yang dicampur ke dalam aspal dengan penetrasi 60/70. Penelitian ini bertujuan untuk mengetahui karakteristik *marshall* aspal modifikasi plastik LDPE meliputi: stabilitas, kelelahan (*flow*), nilai kepadatan (*Density*), *Void in the Mix* (*VIM*), *Void Filled with Asphalt* (*VFA*), *Void in Mineral Aggregate* (*VMA*), *Marshall Quotient* (*MQ*) serta mengetahui pengaruh penambahan plastik LDPE terhadap karakteristik *marshall* dan mengetahui nilai kadar plastik LDPE optimum yang tahan terhadap beban lalu lintas dan deformasi. Peneliti menggunakan variasi kadar plastik LDPE sebesar 0%, 1%, 2%, 3%, 4%, dan 5% dari kadar aspal optimum. Dari hasil pengujian didapatkan bahwa pengaruh penambahan plastik LDPE terhadap nilai stabilitas yaitu nilai stabilitasnya lebih besar daripada campuran aspal tanpa penambahan LDPE. Begitu pula dengan nilai *MQ* yang lebih besar nilainya dibandingkan campuran aspal biasa. Semakin besar kadar plastik LDPE yang ditambahkan, nilai *flow*, *VIM*, dan *VMA* pada campuran aspal modifikasi akan semakin kecil. Sebaliknya nilai *density* dan *VFA* akan bertambah bila kadar plastik LDPE ditambahkan pula. Berdasarkan persyaratan Bina Marga, kadar 1% hingga 5% dinyatakan memenuhi spesifikasi dan kadar plastik optimum LDPE yaitu kadar plastik 4% yang memiliki ketahanan terhadap beban lalu lintas dan deformasi yang terbesar.

Kata kunci: aspal modifikasi, plastik, *Low Density Polyethylene* (LDPE), karakteristik *marshall*

MARSHALL CHARACTERISTICS OF ASPHALT MODIFICATION WITH PLASTIC LOW DENSITY POLYETHYLENE (LDPE) ADDITION

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ABSTRACT

Pavement is a mixture of aggregate such as river stone, broken stone, split stone, and the side product of steel smelting with asphalt, cement, and clay, which is used to serve traffic loads. Asphalt is used in flexible pavement structures because the result is good, comfortable, and easy to do. In addition to the advantages of the asphalt, asphalt has the disadvantage that eventually have deformation after experiencing loading. Way to overcome the shortcomings of asphalt is by adding additives. This research uses Low Density Polyethylene (LDPE) plastic which is mixed into asphalt with 60/70 penetration. This study aims to determine the characteristics of marshall asphalt LDPE plastic modifications include: stability, melt (flow), density (Density), Void in the Mix (VIM), Void Filled with Asphalt (VFA), Void in Mineral Aggregate (VMA) , Marshall Quotient (MQ) as well as knowing the effect of adding LDPE plastic to the characteristics of Marshall and knowing the value of the optimum LDPE plastic content that is resistant to traffic loads and deformation. Researchers used variations in LDPE plastic content of 0%, 1%, 2%, 3%, 4%, and 5% of optimum asphalt content. Resulting from the research, it was found that the effect of adding LDPE plastic to the stability value is that the stability value is greater than asphalt mixture without the addition of LDPE. Similarly, the MQ value is greater than the ordinary asphalt mixture. The greater the LDPE plastic content added, the smaller flow value, VIM, and VMA in the modified asphalt mixture. Conversely the value of density and VFA will increase if LDPE plastic content is added. Based on Bina Marga requirements, the 1% to 5% content meets the specifications and the optimal LDPE plastic content is 4% plastic content which has the biggest resistance to traffic load and deformation.

Keywords: modified asphalt, plastic, Low Density Polyethylene (LDPE), marshall characteristics