Asia Proceedings of Social Sciences

Journal Homepage: http://readersinsight.net/APSS

8th ASIA International Conference (KLCC, Malaysia)

Skid Resistance Value of Paving Hot Mix Asbuton with a Variation of Compacting Temperature

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Submitted: 22 March 2023 *Revised: 06 June 2023* *Accepted: 14 June 2023*

Peer-review under responsibility of 8th ASIA International Conference (KLCC, Malaysia) Scientific Committee
http://connectingasia.org/scientific-committee/

https://doi.org/10.31580/apss.v11i1.2800

ABSTRACT

Cold paving hot mix asbuton is a modified mixture of asbuton consisting of granular asbuton, aggregate, rejuvenating material, and additives mixed with hot and cold heat at 30°C. Asbuton cold paving hot mix asphalt is the latest modified asphalt from Asbuton, and it is necessary to do a cantabro test with the aim of the study being to determine the wear value on cold paving hot mix asphalt with variations in compaction temperature and immersion time. The study used variations in compaction temperature, namely 25°C, 50°C, 75 °C, and 100 °C, and variations in immersion time for 30 minutes, 24 hours, and 48 hours. The results of the optimum asphalt content obtained in the asphalt extraction test are 6,327%. The results of the wear value in a stable study for 500 revolutions were obtained at a solidification temperature of 100 °C, with results of 11,54% at a 30-minute soaking time, 14,93% at a 24-hour immersion time, and 13,63% at a 48-hour immersion time. The wear and tear has met the 2018 Bina Marga specification standard with a value requirement for wear, of 20%. Based on the results of tests carried out in the laboratory, it can be stated that in cold paving with hot mix asphalt, the compaction process should be carried out at a compaction temperature of 100 °C.

Keywords: *Asphalt Content; Cold Paving Hot Mix Asbuton; Skid Resistance*

RESEARCH HIGHLIGHTS

Road infrastructure is one of the means of transportation that has a very high carrying capacity, in addition to making hot mixtures and using local materials as road pavement mixtures, this oil asphalt can also be used to replace large asphalt from Indonesia with natural buton bitumen located on Buton Island (Sihombing, 2021). Whereas the utilization of asbuton that has just been developed is cold paving hot mix asbuton (CPHMA), cold paving hot mix asbuton is a mixture of asbuton consisting of aggregate, granular asbuton, rejuvenator, and other added materials if needed, mixed with hot cold heat (30°C) (Erdawaty, 2020). The compacting temperature and immersion time of cold paving hot mix asbuton using Asbuton B50/30 at compaction temperatures of 25°C, 50°C, 75°C, and 100°C can affect marshall performance (Ramdhani, 2021).

Research Objectives

One of them is the highly developed road pavement in Indonesia, which is made using oil asphalt as a hot mixture. In addition to making hot mixtures and using local materials as road pavement mixtures, this oil asphalt can also be used to replace large asphalt from Indonesia with natural buton bitumen located on Buton Island, Indonesia (Djakfar, 2022). As for the supply of asbuton on this island, it reaches 650 million tons (Alpius, 2019). Whereas the utilization of asbuton, which has just been developed, is cold paving hot mix asbuton. Cold paving hot mix asbuton is a mixture of asbuton consisting of aggregate, granular asbuton, rejuvenator, and other added materials if needed, mixed with hot cold heat (30 °C) (Sentosa, 2020). Skid resistance will be found with the Cantabro test to find the value of the pavement layer's resistance to wear using the Los Angeles machine (Mabui, 2020). Before being put into the Los Angeles machine, the test object was first weighed to determine its initial weight. This cantabro test illustrates how much resistance the asphalt

pavement has to withstand friction between the vehicle's wheels and the road surface (Omer, 2020).

Methodology

The material used in this research is cold-paving hot-mix. Cold Paving Hot Mix Asbuton is a mixture of hot asphalt that is spread cold. Asbuton cold paving hot mix asphalt is one of the results of modifications or new asphalt produced by Asbuton (Madya, 2019). This study uses a literature study where the data is collected by processing the data obtained in the laboratory. The first test object design of the specimens made at the variation of compacting temperature and immersion time was 36 specimens; second step is extraction test, the purpose of the extraction test is to determine the asphalt content contained in the cold paving hot mix asphalt mix asbuton; third step is sieve analysis to determine the percentage by weight of aggregate grains that pass from a set of sieves, meanwhile the objective is to determine the aggregate to be tested, whether the cold paving hot mix asbuton aggregate is included in the specifications for coarse and fine aggregate; and last step is cantabro test, the cantabro test or wear testing on asphalt pavement is to determine the test object's resistance to wear and tear using a Los angeles machine.

Results

According to the results of the extraction test carried out in the laboratory, the asphalt content obtained in the extraction test was 6.356%. The data generated in the extraction test of cold paving hot mix asphalt The cantabro test is used to find the value of the pavement layer's resistance to wear using the Los Angeles machine. This test is done by inserting the test object into the Los Angeles machine. Before being put into the Los Angeles machine, the test object was first weighed to determine its initial weight. This cantabro test illustrates how much resistance the asphalt pavement has to withstand friction between the vehicle's wheels and the road surface. The cantabro test was carried out using variations in compaction temperature and immersion time. The variations of compaction temperature used were 25°C, 50°C, 75 °C, and 100 °C, and the immersion time used was 30 minutes, 24 hours, and 48 hours. From these variations, the value of the cantabro test on cold paving hot mix asphalt for 500 rounds, namely at a compaction temperature of 100 °C, was 11.54% at 30 minutes of immersion, 14.93% at 24 hours of immersion, and 13.63% at 48 hours of immersion.

Findings

The wear value (cantabro test) will be higher if the compaction temperature is lower. Because, the lower the compaction temperature and the longer the soaking time, the higher the results obtained. At a temperature of 25 °C, the results obtained are higher because the long immersion causes the pavement to not experience perfect interlocking, so there are many air voids in the pavement mixture (Rahim, 2019). At a compaction temperature of 25 °C, stability is also obtained, which decreases because the lower the viscosity of the asphalt, the more difficult it is for the asphalt to blend into the mixture, so

cavities in the asphalt cause the stability value to be low. Whereas at a compaction temperature of 100°C, the wear value (Cantabro test), for the percentage of weight loss in the test object is 20%. Because at a compaction temperature of 100°C the asphalt blends perfectly and there are reduced pores in the asphalt mixture, when testing the wear value using a Los Angeles machine, the asphalt is not destroyed. This was also obtained in Nur Hamidah's research (2021), where the stability value met the specifications in the Marshall test, which was obtained at a solidification temperature of 94°C.

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Author's Biography

Alfian Saleh, *S.T., M.Sc., is a permanent lecturer at Lancang Kuning University. Born in Pekanbaru, September 29, 1987. He graduated from the Department of Civil Engineering at the Indonesian Islamic University of Yogyakarta (S1) in 2011 and completed his Masters in Transportation Systems and Engineering (MSTT) study at Gadjah Mada University, Yogyakarta, in 2014. Work experience began as a permanent lecturer at the Civil Engineering Study Program at Lancang Kuning University (2015-present) by teaching the courses Geometry of Highways, Highway Pavement, Airports, Traffic Engineering, and Transportation Modeling. The book that has been written is the Textbook of Road Geometry.*