Analysis of Water Damage Test of Superflex Modified Asphalt and Asphalt Mix

Qiuyun Wang

Chongqing Vocational College of Transportation, Chongqing, 404100, China

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Abstract: This paper first introduces SUPERFLEX modified asphalt, including high temperature stability, low temperature stability and blending process, and then introduces the water damage test of asphalt mixture, including asphalt mixture performance test and mixture mechanical properties test, hoping to provide effective reference for relevant people.

1. Introduction

the problem of water damage of asphalt pavement is a common problem of asphalt pavement, which reduces the application life of asphalt pavement to a certain extent, at the same time, it also expands the expenditure of highway maintenance cost, reduces the road transportation capacity and traffic safety.

2. Superflex Modified Asphalt

2.1 High Temperature Stability of Superflex Modified Asphalt

Under the condition of increasing the content of SUPERFLEX modifier, the cloth viscosity of the modified asphalt itself is further expanded, so the increase of the amount of modifier added, SUPERFLEX the high temperature stability of the modified asphalt will be continuously improved. matrix asphalt and modifier will mainly produce dissolution and reaction at about 180 degrees celsius. under the condition of low temperature, because the existence of partial SUPERFLEX has not been dissolved with the matrix asphalt, it will make the softening point and viscosity relatively high, and this value can not fully reflect the true situation. Under the condition that the stirring temperature continues to rise, the high temperature performance of the modified asphalt will also decrease one after another, which is the dissolution and reaction between the modifier and the matrix asphalt. and the temperature exceeds the standard, the modified asphalt will have a lot of contact with the air in stirring, so that the two indexes can be improved. If the stirring time is less than 25 minutes, or if a low rotational speed is maintained, SUPERFLEX can not be fully dissolved with the matrix asphalt, and the high temperature performance of the modified asphalt itself will be stabilized one after another under the condition of relatively long mechanical action time.

2.2 Low Temperature Stability of Superflex Modified Asphalt

At the condition of increasing the amount of modifier, it can effectively improve the low temperature performance related to the 5 degrees Celsius ductility of SUPERFLEX modified asphalt, because expanding the amount of modifier filling can optimize the proportion of relevant elastic components in the modified asphalt, and the asphalt ductility will also increase under the condition of increasing production. SUPERFLEX the condition of low temperature, the modifier can not fully melt with the base asphalt, but in the condition of continuous temperature rise, it will produce more obvious swelling effect and strengthen the compatibility of the two materials. The low temperature performance of modified asphalt can be optimized by stirring at standard speed.

Under the condition of increasing stirring time, the SUPERFLEX modifier will fuse with the matrix asphalt, and the melting reaction between the matrix asphalt and the modifier is relatively low. By increasing the speed and prolonging the stirring time, it can also promote the overall fusion of the SUPERFLEX modified asphalt, and optimize and adjust the low temperature performance of

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the modified asphalt itself. The amount of modifier will greatly affect the low temperature performance of asphalt itself.

2.3 Superflex Modified Asphalt Mixing Process

During the actual configuration, the main factors that will adversely affect the overall performance of SUPERFLEX modified asphalt are shown in Table 1:

Table 1 Superflex Proposed Parameters of Modified Asphalt

Impact factors	Stirring time	Admixture of modifier	Stir temperature	Speed of stirring
Control size	40 minutes	15%	175 to 185 degrees Celsius	5000 rad per minute

Combined with the above suggested values, the relevant blending process SUPERFLEX modified asphalt can be further clarified. first, it is necessary to heat the oven, raise the temperature to 195 degrees celsius, wait for an hour, and place the container stored SUPERFLEX the modified reagent in the oven. the second is to put the matrix asphalt in an oven with a temperature of 155 degrees celsius and heat it so that it can meet the corresponding viscosity standard to ensure that the SUPERFLEX modified reagent and the matrix asphalt both maintain the same viscosity. then the two materials are poured into the shear container together, the SUPERFLEX modified reagent is removed from the oven, and a certain amount of modifier is added to the matrix asphalt according to the specific requirements. attention is paid to controlling air and avoiding excessive contact between samples and air. he stirring speed of the shear device needs to be maintained at about 5000 RAD per minute. this speed standard is able to avoid excessive air entry into the sample. based on conditions of 175 to 180 degrees celsius ,40 minutes of shear stirring is implemented to promote the full fusion of materials.

3. Water Damage Test for Asphalt Mixture

3.1 Performance Test of Asphalt Mixture

The final purpose of this operation is to simulate the field aging asphalt water loss through the later asphalt aging, and to test the aging mixture after aging with thin film, and to determine the rutting degree. The relevant test data are shown in Table 2:

Table 2 Rutting Test Results of Asphalt Mixture

Type of mixture	Rutting depth of specimens in each time period				
	5 hours	4 hours	3 hours	2 hours	1 hour
Matrix asphalt	83 mm	55 mm	28 mm	2.2 mm	1.1 mm
SBS modified asphalt	88 mm	59 mm	39 mm	4.1 mm	1.7 mm
SUPERFLEX modified asphalt	69 mm	48 mm	32 mm	6 mm	1.6 mm

Under the action of rutting wheel, although there are some differences in rutting depth between the three modified asphalt, the result is not very obvious, and SUPERFLEX modified asphalt is the largest of the mixture rutting in two hours, and the rutting depth is far lower than that of other mixtures under the condition of continuous extension of time.

The pit water loss test is carried out because some highways are prone to pit problems after water damage, and through the investigation of relevant data, it can be found that there are large differences in the pit area in different highways. In order to make the test have a certain contrast, the shape of the pit can be unified during the implementation of the pit simulation test. The first one needs to be weighed before the specimen is formed, the second is the 4cm thickness specimen, the ruler is used to measure the forming rut specimen, and find out the center position and mark it. Before it is cooled, the specimen can be formed by using a knife at 10cm diameter ,2cm center depth and 0cm around. Put the material in it, refrigerate for 16 hours, and put it in a constant temperature tank of 60 degrees, recycle it three times repeatedly, wait for the end of the last time

with the belt, the temperature of the specimen is 0 degrees, put it in the rutting instrument. The fourth is to adjust the temperature sensor so that it can be operated at room temperature. After 5 minutes of rolling operation, the surface of the specimen is thoroughly cleaned to remove the loose suspended particle specimen. The fifth is to place the specimen in 25 degrees water for 24 hours of full water, then put it in a constant temperature refrigerator of 0 degrees Celsius for 16 hours, and continue to repeat the fourth step. The sixth is to put the remaining specimen in a state of 150 degrees Celsius, dry the moisture in it, and extract the reagent, wait for the specimen to be completely cooled, and measure the quality of the test die and the specimen. Cycle tests were carried out for various types of aggregates, resulting in data as shown in Table 3:

Table 3 Particle Drop Rate after Freeze-Thaw of Rutting Plate of Asphalt Mixture Pit

Type of mixture	Granulation drop%			Average%
15% SUPERFLEX modified asphalt	1.11	1.03	1.05	1.06
SBS modified asphalt	1.40	1.67	1.58	1.55
Common asphalt	1.75	1.92	1.95	1.87

Through the analysis of the above table, it can be found that because of the low temperature performance of SUPERFLEX modified asphalt itself, it has strong water damage and tensile strength, and has the lowest granulation rate, which is much lower than that of SBS modified asphalt mixture.

3.2 Test on Mechanical Properties of Mixtures

By means of a MTS test device, three-point bending tests are carried out for trabecular specimens made of asphalt mixture, and loaded at a speed of one millimeter per minute in strict accordance with the bending test requirements of asphalt mixture. The distance between the two sides of the lower bearing plate is 10 cm.

Fig.1 Mts Three-Point Bending and Drawing of Material Test System

After the test, two regular characteristics were found: first, the temperature was before less than 0 degrees celsius, because the moisture in the asphalt void condensed into ice, and under the action of ice, there was also stress failure in the mixture. in the bending and pulling test, it can be found that the strength decreased obviously, even under the condition of temperature rise, it did not change much. However, under the condition that the temperature exceeds 0 degrees Celsius, compared with the trabecular test, the flexural tensile strength is relatively reduced, SUPERFLEX the modified mixture is in the normal temperature state, and after saturated water, there is still a good flexural tensile strength.

4. Conclusion:

To sum up, through systematic research on SUPERFLEX modified asphalt, it can provide an effective reference for improving asphalt configuration method, and combine the characteristics of water loss to find an effective solution to the problem of asphalt pavement, and at the same time,

combine the study of mixture performance to obtain a scientific method.

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