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Engineering Application and Development of Anti-skid Sand

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Abstract: In view of the increasing cement concrete pavement in China, the proportion of road non-slip surface layer is large, the winter slippery performance is insufficient and the later non-slip treatment is difficult. Through the concrete construction and post-application and development of the anti-skid sand in the road and bridge, the feasible anti-skid optimization measures are put forward.

Keywords: anti-skid sand; cement concrete pavement; road anti-slip surface layer; later non-slip treatment; optimation to improve

1 Introduction

A ground non-slip problem in china was put forward earlier from the consideration of the use of safety aspects of the disabled,and quantitative anti-skid indications are put forward from the sports venues. Urban road, square and building floor anti-skid test indicators should reach the corresponding standards. And cement concrete pavement, especially high-speed concrete floor, are required anti-skid deceleration initiatives. The anti-skid performance of asphalt pavement is closely related to traffic safety, and it is affected by many factors including prosperties of raw material gradation, surface moisture, temperature as well as construction[1]. With the continuous improvement of the quality of the building and municipal roads materials on the ground surface, especially from the 90s of last century, a large number of polished stone, glazed tiles, polished tiles and glass finishes, in the pursuit of beautiful one-sided understanding, ignore the basic use of this requirement of ground anti-skid. With the number of pedestrian travel slipped events, building anti-skid problem has increased more and more attention. However, people's understanding of the anti-skid and unreasonable application also caused a great waste. Road anti-skid sand is directly piled up on the roadside, which not only affects the traffic, but also

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causes recycling inconvenience. So the construction process and management needs to be updated, making anti-skid sand, the most common material plays a better role in our life. Anti-skid sand is widely used in the construction industry, which has an irreplaceable advantage, both on the bridge construction and in the latter part of the maintenance. Especially its low price, it becomes one of the main measures of winter anti-skid.

2 Basic composition of antiskid sand

2.1 Concept of anti-skid sand

Anti-skid sand is generally divided into two types, natural sand and artificial sand. Formed by the natural conditions (mainly rock weathering) and composed of the rock particle below the particle size of 5 mm, it is known as natural sand, such as river sand. Naturally, the particle size of the scoured river sand is between 0.75 ~ 2.36 mm.

Artificial sand is made of rock crushed. Because of its high cost, more sheet and powder sand, it is not used widely. At the same time, according to the size of the fineness modulus, the sand is divided into coarse sand, medium sand, fine sand and extra-fine sand.

2.2 Features and applications of anti-skid sand

Every kind of sand has a unique opplication. When concrete is configured, the medium sand should be preferentially used, which is usually incorporated into the concrete as a fine aggregate. For smooth plaster and pointing with mortar, fine sand should be used, and it becomes a non-slip road. While the late road anti-skid treatment generally uses artificial sand or fine sand, which is loaded in anti-slip box.

2.3 Advantage of anti-skid sand

Anti-skid sand construction is convenient, not easy to dust, and late recovery is convenient. Compared with other chemical anti-slip agent, it is basically pollution-free. And its price is low, which can be used for many times. Colorful non-slip sand mixed with high-molecular adhesive, plays a warning role in non-slip road.

3 Anti-slip mechanism of antiskid sand

3.1 Cement concrete floor

For the cement concrete pavement which has been opened to traffic, the anti-skid performance of cement concrete

pavement is one of the important factors that affects the performance of cement concrete pavement. With time going by, the vehicle tire rolling on its surface texture structure has a lasting wear effect, resulting in its decreased anti-skid performance. Waste sand, as a reinforcement, replacing a part of the natural fine aggregate, can improve the compressive strength and flexural strength of the waste sand cement concrete material. At the same time, to a certain extent, it also has a certain contribution to the wear resistance and impact toughness of the concrete composite material.

3.2 Raod anti-slip surface layer

Anti-slip sand, a fine aggregate,added into the anti-slip surface layer, can improve the overall anti-skid ability.

3.3 Later road anti-skid

When it rains or snows, the road is frozen and the anti-skid sand is prepared to prevent the vehicle from slipping. After the pavement is frozen, the salt will be spreaded in the rolling of the road at once. Through the humidity caused by the ice meeting with the salt, the salt gradually melt. With the melting of salt, we spread gradually sand on the salt surface. After the locomotive walking, the molten salt is permeated into the sand, and a 5~7 mm thick salt sand slip layer is formed on the road. At the same time, sand on the ice, some will fall into the ice, increasing the roughness of the contact surface, thereby increasing the friction.

4 Construction of anti-skid sand

4.1 Construction process of cement concrete

Firstly, cleaning the cement concrete old road with a sprinkler; Then, polishing the cement concrete road comprehensively; Road polished should reach a 2 mm deep fine pattern and show a new surface; After the road polished, the hair dryer operator cleans the road surface dust. The road cleaned does not allow personnel to enter, so as not to cause the second road pollution. After the clean road has been dried, the construction workers carry out the epoxy material and river sand for the recipe, and continue to stir with a hand-held mixer. After the epoxy material and the river sand mixture are stirred, the construction personnel will quickly put the mixture on the dry road after grinding and cleaning. The laying is quick and uniform, the thickness is 3 ~ 4 mm. And cloth steel grit. After sprinkling iron and steel grit, iron grit and epoxy materials require curing for 48 h, and then sweep the unbonded steel grit. Open the traffic after cleaning up the road.

4.2 Construction technology of non-slip surface layer

In order to obtain good anti-skid effect, construction performance and coarse aggregate bonding fastness, the coarse aggregate, coarse sand and cement should be mixed with the appropriate ratio of cement.

5 The improvement measures of anti-skid sand

5.1 Improved composition of anti-skid sand

Adding a small amount of fly ash and slag to make larger particles, and its water absorption and friction performance can be further enhanced. Steel slag has also been recently used, worldwide, as hard aggregates in wearing courses in order to improve the skidding resistance of asphalt pavements[2].

5.2 Improved color of anti-skid sand

Europe, America and Japan and developed countries have already carried out research and development in colored non-slip surface coating. Color non-slip pavement has been used in parking lot, bus lanes, bicycle lanes, accident-prone points[3]. Colored non-slip sand has high wear resistance, bright colors (better than the effect of bright colorful aggregate), all the same color, never fade, completely eliminate the discolor and odor of colorful aggregate and other non-environmental fatal weakness. Self-cleaning and non-dust capacity, it also can be recycled by the new technology. Such as colored glass crystal sand material non-slip road surface in use can provide a higher ability than the original road surface friction coefficient, showing a strong anti-skid performance, especially in rain and snow and other weather conditions. Color glass crystal sand non-slip road surface plays a significant role in the anti-skid deceleration, safety warning, landscaping and other aspects. It is worthful to promote the use of special sections of the road.

5.3 Anti-skid tiles

The use of Wuhai Zisha production of high-grade anti-skid red tiles, raw materials easy to get, low cost, reasonable process formula, product quality and stability for living room, hotels, restaurants, bedroom floor decoration, bright color, simple and elegant, there is a broad market prospects.

5.4 Dustproof of gravel pavement

It is necessary to improve the safety and reliability of dustproof network[4]. Gravel pavement paved with asphalt pavement can reduce the dust content of 90% and dustproof effect is significant.

6 Conclusions

The anti-skid sand can greatly improve the slippage resistance of the concrete, the anti-slip surface layer performance and the late anti-skid treatment. It has significant advantages. Therefore it should be widely applied to the related project.

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Brief Biographies

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